UNIT TERMINAL OBJECTIVE

1-1 At the completion of this unit, the paramedic student will understand his or her roles and responsibilities within an EMS system, and how these roles and responsibilities differ from other levels of providers.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-1.1 Define the following terms: (C-1)
- **a. EMS Systems**
- **b. Licensure**
- **c. Certification**
- **d. Registration**
- **e. Profession**
- **f. Professionalism**
- **g. Health care professional**
- **h. Ethics**
- **I. Peer review**
- **j. Medical direction**
- **k. Protocols**

1-1.2 Describe key historical events that influenced the development of national Emergency Medical Services (EMS) systems. (C-1)

1-1.3 Identify national groups important to the development, education, and implementation of EMS. (C-1)

1-1.4 Differentiate among the four nationally recognized levels of EMS training/ education, leading to licensure/ certification/ registration. (C-1)

1-1.5 Describe the attributes of a paramedic as a health care professional. (C-1)

1-1.6 Describe the recognized levels of EMS training/ education, leading to licensure/ certification in his or her state. (C-1)

1-1.7 Explain paramedic licensure/ certification, recertification, and reciprocity requirements in his or her state. (C-1)

1-1.8 Evaluate the importance of maintaining one's paramedic license/ certification. (C-3)

1-1.9 Describe the benefits of paramedic continuing education. (C-1)

1-1.10 List current state requirements for paramedic education in his/ her state. (C-1)

1-1.11 Discuss the role of national associations and of a national registry agency. (C-1)

1-1.12 Discuss current issues in his/ her state impacting EMS. (C-1)

1-1.13 Discuss the roles of various EMS standard setting agencies. (C-1)

1-1.14 Identify the standards (components) of an EMS System as defined by the National Highway Traffic Safety Administration. (C-1)

1-1.15 Describe how professionalism applies to the paramedic while on and off duty. (C-1)

1-1.16 Describe examples of professional behaviors in the following areas: integrity, empathy, self-motivation, appearance and personal hygiene, self-confidence, communications, time management, teamwork and diplomacy, respect, patient advocacy, and careful delivery of service. (C-1)

1-1.17 Provide examples of activities that constitute appropriate professional behavior for a paramedic. (C-2)

1-1.18 Describe the importance of quality EMS research to the future of EMS. (C-3)

1-1.19 Identify the benefits of paramedics teaching in their community. (C-1)

1-1.20 Describe what is meant by "citizen involvement in the EMS system." (C-1)

1-1.21 Analyze how the paramedic can benefit the health care system by supporting primary care to patients in the out-of-hospital setting. (C-3)
1-1.22 List the primary and additional responsibilities of paramedics. (C-1)
1-1.23 Describe the role of the EMS physician in providing medical direction. (C-1)
1-1.24 Describe the benefits of medical direction, both on-line and off-line. (C-1)
1-1.25 Describe the process for the development of local policies and protocols. (C-2)
1-1.26 Provide examples of local protocols. (C-1)
1-1.27 Discuss prehospital and out-of-hospital care as an extension of the physician. (C-1)
1-1.28 Describe the relationship between a physician on the scene, the paramedic on the scene, and the EMS physician providing on-line medical direction. (C-1)
1-1.29 Describe the components of continuous quality improvement. (C-1)
1-1.30 Analyze the role of continuous quality improvement with respect to continuing medical education and research. (C-3)
1-1.31 Define the role of the paramedic relative to the safety of the crew, the patient, and bystanders. (C-1)
1-1.32 Identify local health care agencies and transportation resources for patients with special needs. (C-1)
1-1.33 Describe the role of the paramedic in health education activities related to illness and injury prevention. (C-1)
1-1.34 Describe the importance and benefits of research. (C-2)
1-1.35 Explain the EMS provider's role in data collection. (C-1)
1-1.36 Explain the basic principles of research. (C-1)
1-1.37 Describe a process of evaluating and interpreting research. (C-3)

AFFECTIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-1.38 Assess personal practices relative to the responsibility for personal safety, the safety of the crew, the patient, and bystanders. (A-3)
1-1.39 Serve as a role model for others relative to professionalism in EMS. (A-3)
1-1.40 Value the need to serve as the patient advocate inclusive of those with special needs, alternate life styles and cultural diversity. (A-3)
1-1.41 Defend the importance of continuing medical education and skills retention. (A-3)
1-1.42 Advocate the need for supporting and participating in research efforts aimed at improving EMS systems. (A-3)
1-1.43 Assess personal attitudes and demeanor that may distract from professionalism. (A-3)
1-1.44 Value the role that family dynamics plays in the total care of patients. (A-3)
1-1.45 Advocate the need for injury prevention, including abusive situations. (A-1)
1-1.46 Exhibit professional behaviors in the following areas: integrity, empathy, self-motivation, appearance and personal hygiene, self-confidence, communications, time management, teamwork and diplomacy, respect, patient advocacy, and careful delivery of service. (A-2)

PSYCHOMOTOR OBJECTIVES

None identified for this unit.

DECLARATIVE

- **I. Introduction**
  - **A. Role of the paramedic quite different today from the "ambulance driver" of yesterday**
  - **B. Paramedics engage in a variety of professional activities**
    - **1. Enhance their ability to provide quality service**

- **II. EMS system development**
  - **A. Pre-20th century**
    - **1. Biblical**
    - **2. Edwin Smith papyrus (1500 B.C.)**
    - **3. Code of Hammurabi**
    - **4. Jean Larrey, physician - Napoleonic Wars - ambulances volantes (1790s)**
    - **5. American Civil War**
      - **a. Clara Barton, nurse**
      - **b. Coordinated service for wounded**
    - **6. New York City Health Department Ambulance Service - 1869**
  - **B. 20th Century**
    - **1. WWI and WWII developments**
      - **a. Battlefield ambulance corps developed**
    - **2. 1950s and 1960s**
      - **a. Urban, hospital-based systems develop into municipal services**
      - **b. Rural funeral homes develop into volunteer fire and freestanding services**
      - **c. 1966 National Academy of Sciences - National Research Council report**
        - **(1) "Accidental Death and Disability: The Neglected Disease of Modern Society" (the White Paper)**
        - **(2) Defined 10 critical points**
      - **d. Highway Safety Act of 1966**
        - **(1) Created USDOT as a cabinet-level department**
        - **(2) Provided legislative authority and finance to improve EMS**
        - **(3) More than $142 million between 1968 and 1979**
        - **(4) Early advanced life support pilot programs**
      - **e. Mortality comparisons - WWI to Vietnam**
        - **(1) Advances in field care emerged for trauma patients**
        - **(2) Reduced deaths from similar trauma**
    - **3. 1970s**
      - **a. 1973 Emergency Medical Service Systems Act**
        - **(1) Defined 15 required components**
        - **(2) Regional approach, trauma focus**
      - **b. Regional system development 1974 - 1981**
      - **c. 1977 national educational standards for paramedics first developed**
    - **4. 1980s-90s**
      - **a. Omnibus Budget Reconciliation Act of 1981**
      - **b. "Preventive Health and Health Services Block Grant" consolidation**
      - **c. National Highway Traffic Safety Administration (NHTSA) effort to sustain the DHHS effort with reduced funding and staff**
      - **d. NHTSA's "10 System Elements"**
      - **e. Responsibility for system development, funding, etc., returned to states**
        - **(1) Funding reduced, efforts diminish, and momentum lost**
      - **f. Health care reform**

(1) Managed care, expanded scope of practice, etc.

III. Current EMS system
- A. Network of coordinated services that provide aid and medical care to the community
- B. Work as a unified whole, to meet the emergency care needs of a community
- C. Standards (components) of an EMS System
  - 1. Defined by the National Highway Traffic Safety Administration
    - a. Regulation and policy
    - b. Resource management
    - c. Human resources and training
    - d. Transportation
    - e. Facilities
    - f. Communications
    - g. Trauma systems
    - h. Public information and education
    - i. Medical direction
    - j. Evaluation
- D. EMS system operation
  - 1. Citizen activation
  - 2. Dispatch
  - 3. Out-of-hospital care
  - 4. Hospital care
  - 5. Rehabilitation
- E. EMS provider levels
  - 1. Dispatchers
  - 2. First Responder
  - 3. EMT-Basic
  - 4. EMT-Intermediate
  - 5. Paramedic

IV. National EMS group involvement
- A. Involved in the development, education, and implementation of EMS
  - 1. National organizations
  - 2. State organizations
  - 3. Regional organizations
  - 4. Local organizations
- B. Benefits of involvement
  - 1. National associations
    - a. Information sharing
    - b. Promotes the profession
    - c. Enhances the status of the profession
    - d. Provides a means for a unified voice
  - 2. Joint Review Committee on Educational Programs for the EMT-Paramedic
  - 3. National Registry of EMTs
    - a. Contributes to the development of professional standards
    - b. Verifies competency by preparing and conducting examinations
    - c. Vehicle for simplifying the process of state-to-state mobility (reciprocity)
    - d. Spreads costs of exam development, validation, across large user base
- C. Roles of various EMS standard setting groups
  - 1. Establishes standards with input from the profession and the public

2. Ensures public interest is served in standards development and implementation
3. Protects the public
    a. Prevents individuals who do not meet professional standards from licensure/ certification

V. Paramedic education
- A. Initial education
    1. National standard curriculum
        a. Competencies
        b. Pre- or co-requisites
        c. Provided minimum content for a standardized program of study
        d. Includes cognitive, psychomotor, affective objectives
        e. Clinical requirements
        f. Length
            (1) Minimum hours commitment
    2. Educational resources
        a. Facilities
        b. Instructors
        c. Equipment
        d. Clinical experiences
        e. References
        f. Texts
        g. Other instructional materials
    3. Enhancement
        a. Meets additional state or local needs
        b. Needs to change to reflect current practice
- B. Continuing education
    1. Benefits
        a. Maintenance of core or minimal levels of knowledge
        b. Maintenance of fundamental technical/ professional skills
        c. Expansion of skills and knowledge
        d. Cognizance of advances in the profession

VI. Licensure/ certification/ registration
- A. Licensure
    1. Granting of a license to practice a profession
    2. A process of occupational regulation
    3. Permission granted by competent authority to engage in a business, profession, or activity otherwise unlawful
    4. Involves governmental activity
    5. May be required by state or local authorities to practice as a paramedic
- B. Certification
    1. Grants authority to an individual who has met predetermined qualifications to participate in an activity
    2. A document certifying fulfillment of requirements for practice in a field
    3. Usually refers to action of a non-governmental entity
    4. May be required by state or local authorities to practice as a paramedic
    5. Unfounded general belief that “licensed professionals” have greater status than those that are “certified”or “registered”

6. A "certification" granted by a state, conferring a right to engage in a trade or profession, is in fact a "license"

C. Registration
   1. The act of registering
   2. To enroll one's name in a "register" or book of record

D. State and national certification/ recertification requirements

VII. Professionalism

A. Education should help produce a paramedic professional

B. Profession
   1. The existence of a specialized body of knowledge or expertise
   2. Generally, self regulating through licensure or certification verifying competence
   3. Maintains standards including initial and continuing educational requirements

C. Professionalism
   1. Professionals follow standards of conduct and performance for the profession
   2. Adherence to a code of ethics approved by the profession

D. Health care professional
   1. Conforms to the standards of health care professions
   2. Provides quality patient care
   3. Instills pride in the profession
   4. Strives for high standards
   5. Earns respect of others
   6. There are high societal expectations of professionals while on and off duty
   7. EMS personnel occupy positions of public trust
   8. Unprofessional conduct hurts the image of the profession
   9. Commitment to excellence is a daily activity
   10. Image and behavior
      a. How you appear to others and to yourself is important
      b. Vital to establishing credibility and instilling confidence
      c. Highly visible role model
      d. Paramedics represent a variety of persons
         (1) Self
         (2) EMS agency
         (3) State/ county/ city/ district EMS office
         (4) Peers

E. Attributes of professionalism applied to the role of the paramedic
   1. Integrity
      a. Single, most important behavior
      b. Honesty in all actions
      c. Assumed by public in the role of a paramedic
      d. Examples of behavior demonstrating integrity
         (1) Tells the truth
         (2) Does not steal
         (3) Complete and accurate documentation
   2. Empathy
      a. Identification with and understanding of the feelings, situations, and motives of others
      b. Empathy must be demonstrated to patients, families, and other health care professionals
      c. Examples of behavior demonstrating empathy

- (1) Showing caring and compassion for others
- (2) Demonstrating an understanding of patient and family feelings
- (3) Demonstrating respect for others
- (4) Exhibiting a calm, compassionate and helpful demeanor toward those in need
- (5) Being supportive and reassuring of others

3. Self - motivation
   - a. Internal drive for excellence
   - b. Demonstrating self direction
   - c. Examples of behavior demonstrating motivation
     - (1) Taking initiative to complete assignments
     - (2) Taking initiative to improve and/ or correct behavior
     - (3) Taking on and following through on tasks without constant supervision
     - (4) Showing enthusiasm for learning and improvement
     - (5) Demonstrating a commitment to continuous quality improvement
     - (6) Accepting constructive feedback in a positive manner
     - (7) Taking advantage of learning opportunities
4. Appearance and personal hygiene
   - a. A person's manner of carrying and presenting oneself
   - b. Examples of behavior demonstrating good appearance and personal hygiene
     - (1) Clothing and uniform is neat, clean and in good repair
     - (2) Demonstrates good personal grooming
5. Self confidence
   - a. Trust or reliance on yourself
   - b. Having an accurate assessment of your personal and professional strengths and limitations
   - c. Examples of behavior demonstrating self confidence
     - (1) Demonstrates the ability to trust personal judgement
     - (2) Demonstrates an awareness of strengths and limitations
6. Communications
   - a. The exchange of thoughts, messages and information
   - b. Ability to convey information to others verbally and in writing
   - c. The ability to understand and interpret verbal and written messages
   - d. Examples of behavior demonstrating good communications
     - (1) Speaking clearly
     - (2) Writing legibly
     - (3) Listening actively
     - (4) Adjusting communication strategies to various situations
7. Time management
   - a. Organizing tasks to make maximum use of time
   - b. Prioritizing tasks
   - c. Examples of behavior demonstrating good time management
     - (1) Is punctual
     - (2) Completes tasks and assignments on time
8. Teamwork and diplomacy
   - a. Teamwork is the ability to work with others to achieve a common goal
   - b. Diplomacy is tact and skill in dealing with people
   - c. Examples of behavior demonstrating teamwork and diplomacy

- (1) Places the success of the team above self interest
- (2) Does not undermine the team
- (3) Helps and supports other team members
- (4) Shows respect for all team members
- (5) Remains flexible and open to change
- (6) Communicates with co-workers in an effort to resolve problems

9. Respect
   - a. To feel and show deferential regard for others
   - b. Showing consideration and appreciation
   - c. Examples of behavior demonstrating respect
     - (1) Being polite to others
     - (2) Not using derogatory or demeaning terms
     - (3) Behavior in a manner to bring credit to yourself, your associations, and your profession
10. Patient advocacy
    - a. Acting in the best interest of the patient
    - b. Accepting other's right to differ
    - c. Not imposing your beliefs on others
    - d. Examples of behavior demonstrating patient advocacy
      - (1) Not allowing personal (religious, ethical, political, social, legal) biases to impact patient care
      - (2) Placing the needs of patients above own self interest
      - (3) Protecting patient confidentiality
11. Careful delivery of service
    - a. Delivers the highest quality of patient care with careful attention to detail
    - b. Critically evaluates performance and attitude
    - c. Examples of behavior demonstrating a careful deliver of service
      - (1) Mastering and refreshing skills
      - (2) Performing complete equipment checks
      - (3) Careful and safe ambulance operations
      - (4) Following policies, procedures, and protocols
      - (5) Following orders of superiors

VIII. The roles and responsibilities of the paramedic

A. Primary responsibilities

1. Preparation
   - a. Physical, mental, emotional
     - (1) Positive health practices
   - b. Appropriate equipment and supplies
   - c. Adequate knowledge and skill maintenance
2. Response
   - a. Safety
   - b. Timeliness
3. Scene assessment
   - a. Safety
   - b. Mechanism
4. Patient assessment
5. Recognition of injury or illness
   - a. Prioritization
6. Management

- a. Following protocols
- b. Interacting with medical direction physician, as needed

7. Appropriate disposition
   - a. Treat and transport
     - (1) Ground
     - (2) Air
   - b0 Selection of the proper receiving facility
     - (1) Requires knowledge of the receiving facilities
     - (2) Hospital designation/ categorization
     - (3) Based on hospital resource capabilities with regard to optimal patient care
     - (4) Clinical capabilities and specialty availability
       - (a) Emergency department
       - (b) Operating suite
       - (c) Post-anesthesia recovery room or surgical intensive care unit
       - (d) Intensive care units for trauma patients
       - (e) Cardiac
       - (f) Neurology
       - (g) Acute hemodialysis capability
       - (h) Burn specialization
       - (i) Acute spinal cord/ head injury management capability
       - (j) Radiological special capability
       - (k) Rehabilitation
       - (l) Clinical laboratory service
       - (m) Toxicology
         - i Hazmat/ decontamination
       - (n) Hyperbarics
       - (o) Reperfusion
       - (p) Pediatrics
       - (q) Psychiatric facilities
       - (r) Trauma centers
       - (s) High risk delivery
       - (t) Other
     - (5) Transfer agreements
     - (6) Payers and insurance systems
   - c0 Treat and transfer with medical direction
   - d0 Treat and refer with medical direction
8. Patient transfer
   - a0 Acting as patient advocate
   - b0 Briefing hospital staff
9. Documentation
   - a0 Thorough, accurate patient care reports
   - b0 Completed in timely manner
10. Returning to service
    - a0 Preparation of equipment and supplies
    - b0 Preparing crew
      - (1) Debriefing

B0 Additional responsibilities

1. Community involvement

- a0 Role modeling
- b0 Leader activities
- c0 Community activities
- d0 Prevention activities
- e0 Teaching in the community
  - (1) Helps improve health of the community
    - (a) Injury and illness prevention
    - (b) Enhances compliance with treatment regimes, etc.
  - (2) Ensures appropriate utilization of resources through public education
    - (a) When, where, how to use EMS
  - (3) Improves integration of EMS with other health care and public safety agencies
    - (a) Creates cooperative public education efforts
  - (4) Enhances visibility and positive image of EMS providers

2 Supporting primary care efforts
- a0 Some systems may find it beneficial to utilize paramedics in a limited role
- b0 Can help improve the health of the community
- c0 Prevent injuries and illnesses
- d0 Enhance compliance with treatment regimes
- e0 Ensure more appropriate utilization of resources through public education
  - (1) When, where, how to use EMS, or need hospitalization
- f0 Reduce costs of overall system operation
  - (1) Ensure appropriate utilization of out-of-hospital and other non-EMS health care resources
    - (a) Less expensive transportation alternatives
    - (b) Non-hospital ED clinical providers, free standing emergency clinics, etc.

3 Advocating citizen involvement in the EMS system
- a0 Improves EMS system
  - (1) Involvement in establishing needs, parameters
  - (2) Outside, objective view into quality improvement and problem resolution
  - (3) Creates informed, independent advocates for the EMS system

4 Participate in leadership activities
- a0 Advocate/ conduct primary illness and injury prevention initiatives
- b0 Advocate media campaigns to promote EMS issues
- c0 Identify, develop as necessary, and distribute informational materials
- d0 Assist agency with sponsoring prevention activities
- e0 Organize formal and informal illness and injury risk surveys

5 Personal professional development
- a0 Explore alternative career paths
- b0 Continuing education
- c0 Mentoring
- d0 Professional organization involvement
- e0 Work-related issues impacting career growth
- f0 Conducting/ supporting research initiatives

IX Medical direction
- A0 Many services provided by paramedics are derived from medical practices

- **B0 Paramedics operate as "physician extension"**
- **C0 Physicians regarded as the authorities on issues of medical care**
- **D0 Physicians, properly educated and motivated, are a vital component of EMS**
- **E0 Role of the EMS physician in providing medical direction**
  - **1 Education and training of personnel**
  - **2 Participation in personnel selection process**
  - **3 Participation in equipment selection**
  - **4 Development of clinical protocols, in cooperation with expert EMS personnel**
  - **5 Participation in quality improvement and problem resolution**
  - **6 Provides direct input into patient care**
  - **7 Interfaces between EMS systems and other health care agencies**
  - **8 Advocacy within the medical community**
  - **9 Serve as the "medical conscience" of the EMS system**
    - **a0 Advocate for quality patient care**
  - **10 Types of medical direction**
    - **a0 On-line/ direct**
    - **b0 Off-line/ indirect**
- **F0 Benefits of medical direction**
  - **1 On-line**
    - **a0 Immediate and patient specific care**
    - **b0 Telemetry**
    - **c0 Continuous quality improvement**
    - **d0 On-scene**
  - **2 Off-line**
    - **a0 Prospective**
      - **(1) Development of protocols/ standing orders, training**
      - **(2) Selection of equipment, supplies and personnel**
    - **b0 Retrospective**
      - **(1) Patient care report review, continuous quality improvement**
- **G0 Interacting with a physician on the scene**
  - **1 Origins of medical direction**
  - **2 Use of standing orders**
  - **3 Direct field supervision**
  - **4 The non affiliated on-scene physician**

- **X Improving system quality**
  - **A0 Develop a system for continually evaluating and improving care**
    - **1 Continuous quality improvement (CQI)**
      - **a0 Focus on the system and not an individual**
      - **b0 Fix system problems in areas such as**
        - **(1) Medical direction**
        - **(2) Financing**
        - **(3) Training**
        - **(4) Communication**
        - **(5) Prehospital treatment and transport**
        - **(6) Inter-facility transport**
        - **(7) Receiving facilities**
        - **(8) Specialty care units**
        - **(9) Dispatch**
        - **(10) Public information and education**

- (11) Audit and quality assurance
- (12) Disaster planning
- (13) Mutual aid

2 Dynamic process
- a0 Delineate system-wide problems identified
- b0 Elaborate on the cause(s) of the problem
- c0 Aid the problem and develop remedy(ies)
- d0 Lay out plan to correct the problem
- e0 Enforce the plan of correction
- f0 Reexamine the problem

3 Appropriate EMS research can help enhance quality improvement efforts

XI EMS research

A0 Benefits of research

1 Quality EMS research is beneficial to the future of EMS
- a0 Changes in professional standards, training, equipment, procedures
- b0 Based on empirical data, rather than "great ideas" or "new gadget" models

2 EMS funding dependent on scientifically proving the value of EMS services
- a0 Anecdotes will not suffice
- b0 Reduced spending by managed care and governmental bodies
- c0 Outcome studies are needed to assure the continued funding for EMS

3 Enhances recognition and respect for EMS professionals

B0 Basic principles

1 Peer review and publication of research

2 Finding research

3 Types of research
- a0 Descriptive
- b0 Experimental
- c0 Prospective
- d0 Retrospective
- e0 Cross sectional

4 Population

5 Randomization and control
- a0 Sample
  - (1) Systematic sampling
  - (2) Alternative time sampling
  - (3) Convenience sampling
- b0 Sampling error
- c0 Selection bias

6 Parameter
- a0 Nuisance variables

7 Blinding
- a0 Unblinded
- b0 Single blinded
- c0 Double blinded
- d0 Triple blinded

8 Basic statistics
- a0 Descriptive
  - (1) Qualitative
  - (2) Quantitative

- (a) Mean
- (b) Median
- (c) Mode
- (d) Standard deviation

b0 Inferential
- (1) Null hypothesis
- (2) Research hypothesis

9 Research ethics
- a0 Consent

10 Research format
- a0 Introduction
- b0 Methods
- c0 Results
- d0 Discussion
- e0 Conclusion

C0 Conducting research
1. Prepare a question
2. Write a hypothesis
3. Decide what to measure and the best method to measure it
4. Define the population
5. Identify study limitations
6. Seek study approval
7. Obtain informed consent
8. Gather data
   - a0 Conduct pilot trials first
9. Analyze the data
   - a0 Understand the pitfalls of interpreting data
10. Determine what to do with the research product
    - a0 Publish
    - b0 Present
    - c0 Follow-up studies

D0 Examples of research
1. Conclusions based on scientifically sound procedures, techniques, and equipment
2. Answering a clinically important question
3. Results leading to system improvements

E0 EMS providers role in data collection

F0 Evaluating and interpreting research
1. Was the research peer reviewed?
2. What was the research hypothesis?
3. Was the study approved by an institutional review board and conducted ethically?
4. What was the population being studies?
5. What were the entry/ exclusion criteria for the study?
6. What method was used to draw a sample of patients?
7. How many groups were the patients divided into?
8. How were patients assigned into the groups?
9. What type of data were gathered?
10. Does it appear that the study had enough patients enrolled?
11. Do there appear to be any potential confounding variables that are not accounted for?
12. Were the data properly analyzed?

13 **Is the author's conclusion logical based on the data?**
14 **Does it apply in local EMS systems?**
15 **Are patients in the study similar to those in the local EMS system?**

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UNIT TERMINAL OBJECTIVE

1-2 At the completion of this unit, the paramedic student will understand and value the importance of personal wellness in EMS and serve as a healthy role model for peers.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-2.1 Discuss the concept of wellness and its benefits. (C-1)
1-2.2 Define the components of wellness. (C-1)
1-2.3 Describe the role of the paramedic in promoting wellness. (C-1)
1-2.4 Discuss the components of wellness associated with proper nutrition. (C-1)
1-2.5 List principles of weight control. (C-1)
1-2.6 Discuss how cardiovascular endurance, muscle strength, and flexibility contribute to physical fitness. (C-2)
1-2.7 Describe the impact of shift work on circadian rhythms. (C-1)
1-2.8 Discuss how periodic risk assessments and knowledge of warning signs contribute to cancer and cardiovascular disease prevention. (C-1)
1-2.9 Differentiate proper from improper body mechanics for lifting and moving patients in emergency and non-emergency situations. (C-3)
1-2.10 Describe the problems that a paramedic might encounter in a hostile situation and the techniques used to manage the situation. (C-1)
1-2.11 Given a scenario involving arrival at the scene of a motor vehicle collision, assess the safety of the scene and propose ways to make the scene safer. (C-3)
1-2.12 List factors that contribute to safe vehicle operations. (C-1)
1-2.13 Describe the considerations that should be given to: (C-1)
- **a. Using escorts**
- **b. Adverse environmental conditions**
- **c. Using lights and siren**
- **d. Proceeding through intersections**
- **e. Parking at an emergency scene**

1-2.14 Discuss the concept of "due regard for the safety of all others" while operating an emergency vehicle. (C-1)
1-2.15 Describe the equipment available for self-protection when confronted with a variety of adverse situations. (C-1)
1-2.16 Describe the benefits and methods of smoking cessation. (C-1)
1-2.17 Describe the three phases of the stress response. (C-1)
1-2.18 List factors that trigger the stress response. (C-1)
1-2.19 Differentiate between normal/ healthy and detrimental reactions to anxiety and stress. (C-3)
1-2.20 Describe the common physiological and psychological effects of stress. (C-1)
1-2.21 Identify causes of stress in EMS. (C-1)
1-2.22 Describe behavior that is a manifestation of stress in patients and those close to them and how these relate to paramedic stress. (C-1)
1-2.23 Identify and describe the defense mechanisms and management techniques commonly used to deal with stress. (C-1)
1-2.24 Describe the components of critical incident stress management (CISM). (C-1)
1-2.25 Provide examples of situations in which CISM would likely be beneficial to paramedics. (C-1)
1-2.26 Given a scenario involving a stressful situation, formulate a strategy to help cope with the stress. (C-3)
1-2.27 Describe the stages of the grieving process (Kubler-Ross). (C-1)
1-2.28 Describe the needs of the paramedic when dealing with death and dying. (C-1)

1-2.29 Describe the unique challenges for paramedics in dealing with the needs of children and other special populations related to their understanding or experience of death and dying. (C-1)
1-2.30 Discuss the importance of universal precautions and body substance isolation practices. (C-1)
1-2.31 Describe the steps to take for personal protection from airborne and bloodborne pathogens. (C-1)
1-2.32 Given a scenario in which equipment and supplies have been exposed to body substances, plan for the proper cleaning, disinfection, and disposal of the items. (C-3)
1-2.33 Explain what is meant by an exposure and describe principles for management. (C-1)

AFFECTIVE OBJECTIVES
At the completion of this unit, the paramedic student will be able to:

1-2.34 Advocate the benefits of working toward the goal of total personal wellness. (A-2)
1-2.35 Serve as a role model for other EMS providers in regard to a total wellness lifestyle. (A-3)
1-2.36 Value the need to assess his/ her own lifestyle. (A-2)
1-2.37 Challenge his/ herself to each wellness concept in his/ her role as a paramedic. (A-3)
1-2.38 Defend the need to treat each patient as an individual, with respect and dignity. (A-2)
1-2.39 Assess his/ her own prejudices related to the various aspects of cultural diversity. (A-3)
1-2.40 Improve personal physical well-being through achieving and maintaining proper body weight, regular exercise and proper nutrition. (A-3)
1-2.41 Promote and practice stress management techniques. (A-3)
1-2.42 Defend the need to respect the emotional needs of dying patients and their families. (A-3)
1-2.43 Advocate and practice the use of personal safety precautions in all scene situations. (A-3)
1-2.44 Advocate and serve as a role model for other EMS providers relative to body substance isolation practices. (A-3)

PSYCHOMOTOR OBJECTIVES
At the completion of this unit, the paramedic student will be able to:

1-2.45 Demonstrate safe methods for lifting and moving patients in emergency and non-emergency situations. (P-2)
1-2.46 Demonstrate the proper procedures to take for personal protection from disease. (P-2)

DECLARATIVE

- **I. Introduction**
  - **A. Wellness has three components**
    - **1. Physical well-being**
    - **2. Mental and emotional well-being**
  - **B. Implementing lifestyle changes can enhance personal wellness**
  - **C. Enhancing personal wellness can serve as a role model/ coach for others**

- **II. Wellness components**
  - **A. Physical well-being**
    - **1. Nutrition**
      - **a. Nutrients**
        - **(1) Carbohydrates**
        - **(2) Fats**
        - **(3) Proteins**
        - **(4) Vitamins**
        - **(5) Minerals**
        - **(6) Water**
      - **b. Food groups**
        - **(1) Sugar**
        - **(2) Fats**
        - **(3) Proteins**
        - **(4) Dairy products**
        - **(5) Vegetables**
        - **(6) Fruits**
        - **(7) Grains**
      - **c. Principles of weight control**
        - **(1) Eat in moderation**
        - **(2) Limit fat consumption**
        - **(3) Exercise**
      - **d. Tips to change behavior**
        - **(1) Realistic goal**
        - **(2) Commitment to change**
        - **(3) Exercise**
        - **(4) Healthy eating**
        - **(5) Analyzing progress**
    - **2. Physical fitness**
      - **a. Benefits**
        - **(1) Decrease in resting heart rate and blood pressure**
        - **(2) Increase oxygen carrying capacity**
        - **(3) Enhanced quality of life**
        - **(4) Increase muscle mass and metabolism**
        - **(5) Increased resistance to injury**
        - **(6) Improved personal appearance and self image**
        - **(7) Facilitate maintenance of motor skills throughout life**
      - **b. Cardiovascular endurance**
        - **(1) Fitness assessment**
        - **(2) Heart rate target zone**
      - **c. Muscular strength**

- (1) Strength & endurance assessment
- (2) Principles of training
  - (a) Isometric versus isotonic
  - (b) Resistance
  - (c) Sets
  - (d) Frequency

d. Muscular flexibility

- (1) Flexibility assessment
- (2) Principles of muscular flexibility
  - (a) Intensity of exercise
  - (b) Repetitions
  - (c) Frequency
- (3) Prevention and rehabilitation of low back pain

3. Sleep

a. Sleep deprivation

b. Disruption of circadian timing system

4. Disease prevention

a. Cardiovascular disease

- (1) Cardiovascular endurance
- (2) Blood pressure
- (3) Body composition
- (4) Total cholesterol/ HDL ratio
- (5) Triglycerides
- (6) Estrogen use
- (7) Stress
- (8) Periodic risk assessment

b. Cancer

- (1) Dietary changes
- (2) Sun exposure
- (3) Regular examinations
- (4) Warning signs
- (5) Periodic risk assessment

c. Infectious disease

- (1) Hygiene
- (2) Utilize engineering and work practices
- (3) Report exposure promptly
- (4) Periodic risk assessment

5. Injury prevention

a. Body mechanics during lifting and moving

- (1) Only move a patient you can safely handle
- (2) Look where you're walking/ crawling
- (3) Move forward rather than backward when possible
- (4) Take short steps, if walking
- (5) Bend at hips and knees
- (6) Lift with legs, not back
- (7) Keep load close to body
- (8) Keep patient’s body in-line when moving

b. Hostile environments

- (1) Avoidance
- (2) Management

- c. Rescue situations
  - (1) Use protective gear
  - (2) Appropriate training
  - (3) Safe rescue practices
- d. Safe vehicle operation
  - (1) Factors in safe driving
  - (2) Using escorts
  - (3) Adverse environmental conditions
  - (4) Using lights and sirens
  - (5) Proceeding through intersections
  - (6) Parking at an emergency scene
  - (7) "Due regard for the safety of all others"
- e. Safety equipment and supplies
  - (1) Body substance isolation equipment
  - (2) Head protection
  - (3) Eye protection
  - (4) Hearing protection
  - (5) Respiratory protection
  - (6) Gloves
  - (7) Boots
  - (8) Coveralls
  - (9) Turnout coat/ pants
  - (10) Specialty equipment

B. Mental and emotional health

1. Substance misuse/ abuse control
   - a. Addiction
     - (1) Addictive behaviors
     - (2) Methods of management
   - b. Smoking cessation
     - (1) Health ramifications of smoking
     - (2) Why people smoke
     - (3) Techniques
2. Anxiety and stress
   - a. Stress results from the interaction of events (environmental stimuli) and the adjustive capabilities of the individual
     - (1) Usually seen as generating negative affect (fear, depression, guilt, etc.)
     - (2) Also experienced with positive events
   - b. Anxiety is uneasiness or dread about future uncertainties
   - c. Eustress is "good stress"--response to positive stimuli
   - d. Distress is "bad stress"--a negative response to an environmental stimulus
3. Personal time/ meditation/ contemplation
4. Family, peer, community connections
5. Freedom from prejudice
   - a. Acceptance of cultural differences
     - (1) Learn about other cultures
     - (2) Recognize most variations among cultures as positive
     - (3) Affirm the value of differences
   - b. Acceptance of individual differences
     - (1) Recognize existence of differences
     - (2) Listen until you can tell the other person's story

- (3) Work toward win-win solution

III. Stress
- A. Three phases of the stress response
  - 1. Alarm reaction
    - a. Fight or flight phenomenon
    - b. Considered to be positive; takes only seconds
    - c. Prepares individual for action/ self-defense
    - d. Mediated by the autonomic nervous system, coordinated by hypothalamus
    - e. Pituitary gland releases adrenocorticotropic (stress) hormones
    - f. Stimulates glucose production
    - g. Sympathetic response
      - (1) Adrenal gland releases epinephrine and norepinephrine
    - h. Physiological response
      - (1) Increased heart rate
      - (2) Increased blood pressure
      - (3) Dilated pupils
      - (4) Relaxation of bronchial tree
      - (5) Increased blood sugar
      - (6) Slowed digestion
    - i. The reaction ends when the body realizes the event is not dangerous
  - 2. Resistance
    - a. Increased level of resistance to stressor
    - b. Reaction to stressor may change with time
  - 3. Exhaustion
    - a. As stress continues, coping mechanisms are exhausted
    - b. Adaptive resources utilized
    - c. Resistance to all stressors declines
    - d. Increased susceptibility to physical and psychological ailments
    - e. Rest and recovery are needed
- B. Factors that trigger the stress response
  - 1. Loss of something that is of value to the individual
  - 2. Injury or threat of injury to the body
  - 3. Poor health, nutrition
  - 4. Frustration of drives
  - 5. Ineffective coping
- C. Physiological and psychological effects of stress
  - 1. Normal/ healthy responses to stress
  - 2. Detrimental/ unhealthy responses to stress
  - 3. Signs and symptoms of stress
    - a. Physical
      - (1) Chest tightness/ pain, heart palpitations, cardiac rhythm disturbances
      - (2) Difficult/ rapid breathing
      - (3) Nausea, vomiting
      - (4) Profuse sweating, flushed skin, diaphoresis
      - (5) Sleep disturbances
      - (6) Aching muscles and joints
      - (7) Headache
    - b. Emotional
      - (1) Panic reactions

- (2) Fear
- (3) Anger
- (4) Denial
- (5) Feeling overwhelmed

c. Cognitive

- (1) Difficulty making decisions
- (2) Disorientation, decreased level of awareness
- (3) Memory problems, poor concentration
- (4) Distressing dreams

d. Behavioral

- (1) Crying spells
- (2) Hyperactivity
- (3) Withdrawal
- (4) Changes in eating habits
- (5) Increased smoking
- (6) Increased alcohol consumption

D. Causes of stress in EMS

1. Environmental stress
   - a. Siren noise
   - b. Inclement weather
   - c. Confined work spaces
   - d. Rapid scene response
   - e. Life and death decision making
2. Psychosocial stress
   - a. Family relationships
   - b. Conflicts with supervisors, coworkers
   - c. Abusive patients
3. Personality stress
   - a. Need to be liked
   - b. Personal expectations
   - c. Feelings of guilt and anxiety

E. Reactions to stress

1. Reactions are individual and affected by
   - a. Previous exposure to the stressor
   - b. Perception of the event
   - c. Experience
   - d. Personal coping skills
2. Adaptation
   - a. Dynamic evolving process
   - b. Defense
     - (1) Adaptive function of personality
     - (2) Assists in adjusting to stressful situations that confront us
     - (3) Help to avoid dealing with problems, through denial or distortion
   - c. Coping
     - (1) Active, confronting process
     - (2) Information gathered/ used to change or adjust to a new situation
   - d. Problem solving
     - (1) Viewed as a healthy approach to everyday concerns
     - (2) Involves
       - (a) Problem analysis

- (b) Generation of options for action
- (c) Determination of course of action

e. Mastery

(1) Ability to see multiple options/ potential solutions for challenging situations

(2) Results from extensive experience with similar situations

F. Stress management techniques
1. Reframing
2. Controlled breathing
3. Progressive relaxation
4. Guided imagery

G. Critical incident stress management (CISM)
1. Organized, formal, peer and mental health support network and process
a. Enables emergency personnel to vent feelings
b. Facilitates understanding of stressful situations
2. Components of CISM
a. Pre-incident stress training
b. On-scene support to distressed personnel
c. Individual consults
d. Defusing services immediately after a large scale incident
e. Mobilization services after large scale incident
f. Critical incident stress debriefing 24 to 72 hours after an event
g. Follow-up services
h. Specialty debriefings to non-emergency groups in the community
i. Support during routine discussions of an incident
j. Advice to command staff during large scale incident
3. Situations in which CISM should be considered
a. Line of duty injury or death
b. Disaster
c. Emergency worker suicide
d. Infant/ child death
e. Extreme threat to emergency worker
f. Prolonged incident which ends in loss or success
g. Victims known to operations personnel
h. Death/ injury of civilian caused by operations
i. Other significant event
4 Techniques for reducing crisis-induced stress
a0 Rest
b0 Replace food and fluids
c0 Limiting exposure to incident
d0 Change assignments
e0 Provide post event defusing/ debriefing

IV Dealing with death, dying, grief and loss
A0 Patient and family needs
1 Stages of the grieving process (Kubler-Ross)
a0 Denial

(1) Inability/ refusal to believe the reality of the event

(2) Defense mechanism

b0 Anger

- (1) Frustration related to inability to control situation
- (2) May focus on anyone or anything

c0 Bargaining

- (1) Attempt to "buy additional time"
- (2) Make deals to put off or change expected outcome

d0 Depression

- (1) Sadness and despair
- (2) Withdraw/ retreat

e0 Acceptance

- (1) Realization of fate
- (2) Reasonable level of comfort with anticipated outcome

B0 Common needs of the paramedic when dealing with death and dying

1 Support from friends and family following the incident

2 Opportunity to process specific incident

3 Opportunities to process cumulative stress

C0 Developmental considerations when dealing with death and dying

1 Newborn to age three

a0 Children will sense that something has happened in the family

b0 Children will realize that people are crying and are sad all the time

c0 Children will realize that there is much activity in their household

d0 Watch for changes in

- (1) Eating or sleeping patterns
- (2) Irritability

e0 Suggestions

- (1) Be sensitive to the child's needs
- (2) Try to maintain consistency in routines
- (3) Maintain consistency with significant people in the child's life

2 Three to six years of age

a0 Child does not have concept of the finality of death

b0 Believes that the person will return and will continually ask when the person will return

c0 Believes in magical thinking (child may feel he was responsible for the death)

d0 Child may believe that everyone else he loves will die also

e0 Watch for changes in

- (1) Behavior patterns with friends and at school
- (2) Difficulty sleeping
- (3) Changes in eating habits

f0 Suggestions

- (1) Emphasize to the child that he was not responsible for the death
- (2) Reinforce that when people are sad they cry; crying is normal and natural
- (3) Encourage the child to draw pictures of his feelings, or talk about his feelings

3 Six to nine years of age

a0 Beginning to understand the finality of death

b0 Will seek out detailed explanations for the death; differentiate fatal illness from "just being sick"

c0 Will be afraid other significant people in their lives will die as well

d0 Be uncomfortable in expressing feelings; may act silly or embarrassed when talking about death

- e0 Suggest
  - (1) Talk about the normal feelings of anger, sadness and guilt
  - (2) Share your own feelings about death; do not be afraid to cry in front of the child - this gives the child permission to express their feelings
- 4 Nine to twelve years of age
  - a0 Aware of the finality of death
  - b0 Concerned with practical matters concerning the child's lifestyle
  - c0 May want to know all the details surrounding the death
  - d0 May try to "act like an adult", but then show regression to an earlier stage of emotional response
  - e0 Suggestions
    - (1) Set aside time to talk about feelings
    - (2) Encourage sharing of memories to facilitate grief response
- 5 Elderly
  - a0 Concern about other family members
  - b0 Concern about further loss of independence
  - c0 Concern about cost

V Preventing disease transmission

- A0 Terminology
  - 1 Air/ blood borne pathogens
  - 2 Exposure
    - a0 Contact with a potentially infectious body fluid substance
    - b0 Contact with other infectious agent
  - 3 Cleaning, disinfection, sterilization
  - 4 Body substance isolation, universal precautions
    - a0 Practices designed to prevent contact with body substances
    - b0 Practices designed to reduce contact with other agents
- B0 Common sources of exposure
  - 1 Needle stick
  - 2 Broken or scraped skin
  - 3 Mucous membranes of the eyes, nose or mouth
- C0 Protection from air/ blood borne pathogens
  - 1 Follow engineering and work practices
    - a0 Puncture resistant containers
    - b0 Laundry
    - c0 Labeling
  - 2 Maintain good personal health and hygiene habits
    - a0 Hand washing
    - b0 General cleanliness
  - 3 Maintain immunizations
    - a0 Tetanus
    - b0 Polio
    - c0 Hepatitis B
    - d0 MMR (measles, mumps and rubella)
    - e0 Influenza
  - 4 Periodic tuberculosis screening
  - 5 Body substance isolation/ universal precautions
    - a0 Gloves

- **b0 Mask, gown, eye wear**
- **c0 Other equipment**

6 Cleaning, disinfecting, and disposing of used materials/ equipment

D0 Periodic risk assessment

E0 Documenting and managing an exposure

1 Wash the area of contact thoroughly and immediately
2 Document the situation in which the exposure occurred
3 Describe actions taken to reduce chances of infection
4 Comply with all required reporting responsibilities and time frames
5 Cooperate with incident investigation
6 Check tuberculosis/ other screening for exposure
7 Proper immunization boosters
8 Complete medical follow-up

UNIT TERMINAL OBJECTIVE

1-3 At the completion of this unit, the paramedic student will be able to integrate the implementation of primary injury prevention activities as an effective way to reduce death, disabilities and health care costs.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1.3-1 Describe the incidence, morbidity and mortality of unintentional and alleged unintentional events. (C-1)
1.3-2 Identify the human, environmental, and socioeconomic impact of unintentional and alleged unintentional events. (C-1)
1.3-3 Identify health hazards and potential crime areas within the community. (C-1)
1.3-4 Identify local municipal and community resources available for physical, socioeconomic crises. (C-1)
1.3-5 List the general and specific environmental parameters that should be inspected to assess a patient's need for preventative information and direction. (C-1)
1.3-6 Identify the role of EMS in local municipal and community prevention programs. (C-1)
1.3-7 Identify the local prevention programs that promote safety for all age populations. (C-2)
1.3-8 Identify patient situations where the paramedic can intervene in a preventative manner. (C-1)
1.3-9 Document primary and secondary injury prevention data. (C-1)

AFFECTIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1.3-10 Value and defend tenets of prevention in terms of personal safety and wellness. (A-3)
1.3-11 Value and defend tenets of prevention for patients and communities being served. (A-3)
1.3-12 Value the contribution of effective documentation as one justification for funding of prevention programs. (A-3)
1.3-13 Value personal commitment to success of prevention programs. (A-3)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1.3-14 Demonstrate the use of protective equipment appropriate to the environment and scene. (P-3)

DECLARATIVE

I. Epidemiology
- **A. Incidence, morbidity, mortality**
  - **1. Injury surpassed stroke as third leading cause of death**
  - **2. Estimated lifetime cost of injuries >$114 billion**
  - **3. Estimated 19 hospitalizations and 254 emergency department visits for each injury death**
- **B. Effects of early release from hospital on EMS services**
  - **1. Implications are increased access on EMS services for supportive care and intervention**
- **C. Related terminology**
  - **1. Injury**
    - **a. Defined as intentional or unintentional damage to the person resulting from acute exposure to thermal, mechanical, electrical or chemical energy or from the absence of such essentials as heat or oxygen**
  - **2. Injury risk**
    - **a. Defined as real or potential hazardous situations that put individuals at risk for sustaining an injury**
  - **3. Injury surveillance**
    - **a. Defined as ongoing systematic collection, analysis and interpretation of injury data essential to the planning, implementation and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know**
    - **b. The final link in the surveillance chain is the application of these data to prevention and control**
  - **4. Primary injury prevention**
    - **a. Defined as keeping an injury from ever occurring**
  - **5. Secondary and tertiary prevention**
    - **a. Defined as care and rehabilitation activities (respectively) that are preventing further problems from an event that has already occurred**
  - **6. Teachable moment**
    - **a. Defined as the time after an injury has occurred when the patient and observers remain acutely aware of what has happened and may be more receptive to teaching about how the event or illness could be prevented**
  - **7. Years of productive life**
    - **a. Defined as the calculation by subtracting age of death from 65**

II. Feasibility of EMS involvement
- **A. EMS providers are widely distributed amid the population**
- **B. EMS providers often reflect the composition of the community**
- **C. In a rural setting, the EMS provider may be the most medically educated individual**
- **D. More than 600,000 EMS providers in the United States**
- **E. EMS providers are high-profile role models**
- **F. EMS providers are often considered as champion of the health care consumer**
- **G. EMS providers are welcome in schools and other environments**
- **H. EMS providers are considered authorities on injury and prevention**

III. Essential leadership activities
- **A. Protection of individual EMS providers from injury**

1. Policies promoting response, scene and transport safety
2. Appropriate equipment to providers for eye, back, skin safety
3. Appropriate equipment to providers for prevention from communicable and chemical exposure
4. Implementation of safety program
5. Establish a wellness program for EMS providers

B. Provide education to EMS providers
1. Fundamentals of primary injury prevention
2. Incorporation into EMS primary and continuing education programs
3. Establish liaison with public and private sector specialty groups for specific education and training

C. Support and promote collection and use of injury data
1. Develop policies that promote documentation of injuries by EMS providers
2. Modify data collection tools so prompt recording of data is feasible and realistic
3. Contribute to local, statewide and national surveillance systems

D. Obtain support and resources for primary injury prevention activities
1. Establish internal budgetary support
2. Seek financial resource to sponsor injury prevention programs
   a. "In-kind" services
   b. Fees and equipment
   c. Publicity
   d. Network with other injury prevention organizations
   e. Initiate and attend meetings of local organizations involved or requesting involvement in injury prevention

E. Empower individual EMS providers to conduct primary injury prevention activities
1. Identify and encourage interest and support
2. Establish internal budgetary support, where possible
   a. Provide rotational assignment to prevention programs
   b. Provide salary for off-duty injury prevention activities
   c. Reward and/ or remunerate participation

IV. Essential provider activities
A. Education
1. Implementation of primary personal injury prevention strategies
   a. Wellness
      (1) Exercise and conditioning
      (2) Management of stress
         (a) Personal
         (b) Family
         (c) Work environment
   b. Safe driving
      (1) Fundamental driving techniques
      (2) Restraints
         (a) Self
         (b) Patient
         (c) Riders
      (3) Use of personal protective equipment
         (a) Reflective clothing
         (b) Helmets
      (4) Use of lights, sirens

- (5) Approach to, parking at and leaving the scene
- (6) Driving without drinking

c. Scene safety precautions
- (1) Availability and use of law enforcement
- (2) Traffic control
  - (a) Vehicles
  - (b) Bystanders

d. Lifting and moving techniques

e. Recognition of health hazards and potential high profile crime areas

f. Practice on-scene survival techniques

g. Use on-scene survival resources

2. Review the maladies and injuries common to

a. Infancy
- (1) Low birth weight
- (2) Mortality and morbidity

b. Childhood
- (1) Intentional events
- (2) Unintentional events
- (3) Alleged unintentional events

c. Childhood violence
- (1) To self
- (2) To others

d. Adult

e. Geriatrics

f. Recreation

g. Work hazards

h. Day care center
- (1) Licensed
- (2) Non-licensed

i. Early release from hospital

j. Discharge from urgent care, or other out-patient facilities

k. Signs of emotional stress that may lead to intentional and unintentional and alleged unintentional events

l. Self medication
- (1) Dangers of non-compliance
  - (a) Borrowing
  - (b) Taking medications on time and finishing the regimen
- (2) Storage
- (3) Over-medication

V. Implementation of prevention strategies

A. Preservation of safety of the response team
- 1. As in IV A. 1, 2 above

B. Patient care considerations
- 1. Recognize signs/ symptoms of suspected abuse
  - a. Recognition of abusive situations
  - b. Resolving conflict without violence

C. Recognize signs/ symptoms of exposure to
- 1. Hazardous materials
- 2. Temperature extremes

- 3. Vector
- 4. Communicable disease
- 5. Assault, battery
- 6. Structural risks

D. Recognizing need for outside resource
- a. Municipal
- b. Community
- c. Religious

E. Documentation
- 1. Record primary care
- 2. Record primary injury data
  - a. Scene conditions
  - b. Mechanism of injury
  - c. Use of protective devices
  - d. Absence of protective devices
  - e. Risks overcome
  - f. Other as noted by the EMS agency

F. On-scene education
- 1. Recognize/ sense possible recurrence
- 2. Effective communications
  - a. Recognizing the teachable moment
  - b. Non-judgmental
  - c. Objective
  - d. Sense of timing
  - e. Consideration of ethnic, religious and social diversity considerations
- 3. Informing individuals how they can prevent recurrence
- 4. Informing individuals on use of protective devices

G. Resources identified for
- 1. Devices
- 2. Child protective services
- 3. Sexual abuse
- 4. Spousal abuse
- 5. Elder abuse
- 6. Food, shelter, clothing
- 7. Employment
- 8. Counseling
- 9. Alternative health care
  - a. Free clinic
- 10. Alternative means of transportation
- 11. After-care services
- 12. Rehabilitation
- 13. Grief support
- 14. Immunization programs
- 15. Vector control
- 16. Disabled
- 17. Day care
- 18. Alternative modes of education
- 19. Work-study programs
- 20. Mental health resources and counseling

VI. Participation in prevention programs
- **A. Education and training**
  - **1. Population served**
    - **a. Ethnic**
    - **b. Cultural**
    - **c. Religious**
    - **d. Language**
    - **e. Learning disabled**
    - **f. Physically challenged**

REFERENCES

Centers for Disease Control, 1991

Consensus Statement on the role of Emergency Medical Services in Primary Injury Prevention, February 1996

UNIT TERMINAL OBJECTIVE

1-4 At the completion of this unit, the paramedic student will understand the legal issues that impact decisions made in the out-of-hospital environment.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-4.1 Differentiate between legal and ethical responsibilities. (C-2)
1-4.2 Describe the basic structure of the legal system in the United States. (C-1)
1-4.3 Differentiate between civil and criminal law as it pertains to the paramedic. (C-1)
1-4.4 Identify and explain the importance of laws pertinent to the paramedic. (C-1)
1-4.5 Differentiate between licensure and certification as they apply to the paramedic. (C-1)
1-4.6 List the specific problems or conditions encountered while providing care that a paramedic is required to report, and identify in each instance to whom the report is to be made. (C-1)
1-4.7 Define the following terms: (C-1)
- **a. Abandonment**
- **b. Advance directives**
- **c. Assault**
- **d. Battery**
- **e. Breach of duty**
- **f. Confidentiality**
- **g. Consent (expressed, implied, informed, involuntary)**
- **h. Do not resuscitate (DNR) orders**
- **I. Duty to act**
- **j. Emancipated minor**
- **k. False imprisonment**
- **l. Immunity**
- **m. Liability**
- **n. Libel**
- **o. Minor**
- **p. Negligence**
- **q. Proximate cause**
- **r. Scope of practice**
- **s. Slander**
- **t. Standard of care**
- **u. Tort**

1-4.8 Differentiate between the scope of practice and the standard of care for paramedic practice. (C-3)
1-4.9 Discuss the concept of medical direction, including off-line medical direction and on-line medical direction, and its relationship to the standard of care of a paramedic. (C-1)
1-4.10 Describe the four elements that must be present in order to prove negligence. (C-1)
1-4.11 Given a scenario in which a patient is injured while a paramedic is providing care, determine whether the four components of negligence are present. (C-2)
1-4.12 Given a scenario, demonstrate patient care behaviors that would protect the paramedic from claims of negligence. (C-3)
1-4.13 Explain the concept of liability as it might apply to paramedic practice, including physicians providing medical direction and paramedic supervision of other care providers. (C-2)
1-4.14 Discuss the legal concept of immunity, including Good Samaritan statutes and governmental immunity, as it applies to the paramedic. (C-1)
1-4.15 Explain the importance and necessity of patient confidentiality and the standards for maintaining patient confidentiality that apply to the paramedic. (C-1)

1-4.16 Differentiate among expressed, informed, implied, and involuntary consent. (C-2)
1-4.17 Given a scenario in which a paramedic is presented with a conscious patient in need of care, describe the process used to obtain consent. (C-2)
1-4.18 Identify the steps to take if a patient refuses care. (C-1)
1-4.19 Given a scenario, demonstrate appropriate patient management and care techniques in a refusal of care situation. (C-3)
1-4.20 Describe what constitutes abandonment. (C-1)
1-4.21 Identify the legal issues involved in the decision not to transport a patient, or to reduce the level of care being provided during transportation. (C-1)
1-4.22 Describe how hospitals are selected to receive patients based on patient need and hospital capability and the role of the paramedic in such selection. (C-1)
1-4.23 Differentiate between assault and battery and describe how to avoid each. (C-2)
1-4.24 Describe the conditions under which the use of force, including restraint, is acceptable. (C-1)
1-4.25 Explain the purpose of advance directives relative to patient care and how the paramedic should care for a patient who is covered by an advance directive. (C-1)
1-4.26 Discuss the responsibilities of the paramedic relative to resuscitation efforts for patients who are potential organ donors. (C-1)
1-4.27 Describe the actions that the paramedic should take to preserve evidence at a crime or accident scene. (C-1)
1-4.28 Describe the importance of providing accurate documentation (oral and written) in substantiating an incident. (C-1)
1-4.29 Describe the characteristics of a patient care report required to make it an effective legal document. (C-1)
1-4.30 Given a scenario, prepare a patient care report, including an appropriately detailed narrative. (C-2)

AFFECTIVE OBJECTIVES
At the completion of this unit, the paramedic student will be able to:

1-4.31 Advocate the need to show respect for the rights and feelings of patients. (A-3)
1-4.32 Assess his/ her personal commitment to protecting patient confidentiality. (A-3)
1-4.33 Given a scenario involving a new employee, explain the importance of obtaining consent for adults and minors. (A-2)
1-4.34 Defend personal beliefs about withholding or stopping patient care. (A-3)
1-4.35 Defend the value of advance medical directives. (A-3)

PSYCHOMOTOR OBJECTIVES
None identified for this unit.

DECLARATIVE

I. Introduction
- **A. Legal duties and ethical responsibilities**
  - **1. Legal duties are to the patient, medical director, and public**
    - **a. Set by statutes and regulations**
    - **b. Based on generally accepted standards**
  - **2. Ethical responsibilities as a professional**
    - **a. Principles that identify conduct deemed morally desirable**
    - **b. Ethical responsibilities include**
      - **(1) Responding to the physical and emotional needs of every patient with respect**
      - **(2) Maintaining mastery of skills**
      - **(3) Participating in continuing education/ refresher training**
      - **(4) Critically reviewing performance and seeking improvement**
      - **(5) Reporting honestly and respecting confidentiality**
      - **(6) Working cooperatively and with respect for other emergency professionals**
    - **c. NAEMT Code of Ethics exemplifies ethical guidelines for the paramedic**
- **B. Failing to perform the job appropriately can result in civil or criminal liability**
- **C. The best legal protection is provision of appropriate assessment and care coupled with accurate and complete documentation**
- **D. Laws differ from state to state and area to area - get competent legal advice**

II. The legal system
- **A. Types of law**
  - **1. Legislative law**
    - **a. Enacted at federal, state and local levels by legislative branches of government**
    - **b. Product of Congress, city councils, district boards, and general assemblies**
  - **2. Administrative law**
    - **a. Regulations developed by a governmental agency**
    - **b. Agency has the authority to enforce rules, regulations, and statutes**
  - **3. Common law**
    - **a. "Case" or "judge-made" law**
    - **b. Derived from society's acceptance of customs or norms over time**
  - **4. Criminal law**
    - **a. Area of law in which the federal, state, or local government prosecutes individuals on behalf of society for violating laws designed to safeguard society**
    - **b. Violation punished by fine, imprisonment or both**
  - **5. Civil (tort) law**
    - **a. Area of law dealing with private complaints brought by a plaintiff against a defendant for an illegal act or wrongdoing (tort)**
    - **b. Enforced by bringing a civil lawsuit in which the plaintiff requests the court to award damages**
- **B. How laws affect the paramedic**
  - **1. Scope of practice**
    - **a. Range of duties and skills a paramedic is allowed and expected to perform when necessary**

- b. Usually set by state law or regulation and by local medical direction

2. Medical direction
   - a. Required for paramedic practice
   - b. May be off-line or on-line, depending on state and local requirements
   - c. Each system should have a policy to guide paramedics in dealing with on-scene physician
3. Medical practice act
   - a. Legislation that governs the practice of medicine; varies from state to state
   - b. May prescribe how and to what extent a physician may delegate authority to a paramedic to perform medical acts
4. Licensure and/ or certification
   - a. Certification
     - (1) Grants recognition to an individual who has met predetermined qualifications to participate in an activity
     - (2) Usually granted by a certifying agency or professional association, not necessarily a government agency
   - b. Licensure
     - (1) A process of occupational regulation
     - (2) Governmental agency, such as state medical board, grants permission to an individual who meets established qualifications to engage in the profession or occupation
   - c. Either or both may be required by state or local authorities to practice as a paramedic
5. Motor vehicle laws
   - a. Motor vehicle code varies from state to state
   - b. Set standards for equipping and operating an emergency vehicle
6. Mandatory reporting requirements
   - a. Vary from state to state, but often include
     - (1) Child abuse and neglect; elder abuse; spouse abuse
     - (2) Sexual assault
     - (3) Gunshot and stab wounds
     - (4) Animal bites
     - (5) Communicable diseases
   - b. Content of report and to whom it must be made is set by law, regulation or policy
7. Protection for the paramedic
   - a. Infectious disease exposure notification
   - b. Immunity statutes
     - (1) Governmental immunity
     - (2) Good Samaritan laws
   - c. Special crimes against a paramedic
     - (1) Assault or battery to paramedic while performing duties
     - (2) Obstruction of paramedic activity

C. The legal process
   1. The role of the courts
      - a. Trial court
        - (1) Determines outcomes of individual cases
        - (2) Cases may be determined by judge or jury
      - b. Appellate court
        - (1) Hears appeals of decisions by trial courts or other appeals courts

- (2) Decisions may set precedent for later cases

2. Anatomy of a lawsuit
   - a. Incident occurs
   - b. Investigation is conducted by plaintiff's representative
   - c. Complaint is filed in court and served on defendant
   - d. Complaint is answered by defendant
   - e. Discovery occurs
     - (1) Depositions (oral) or interrogatives (written) are taken
     - (2) Documents are gathered (e.g., patient records, patient care reports, etc.)
   - f. Trial is conducted
   - g. Decision is handed down by judge or jury
     - (1) Determines guilt or liability
     - (2) Determines damages and award, if any, to the plaintiff
   - h. Decision may be appealed
     - (1) Either side may appeal
     - (2) Usually can only be based on errors in law made by the court
   - i. Settlement occurs
     - (1) May occur at any stage of the lawsuit
     - (2) Plaintiff agrees to accept settlement in exchange for promise not to pursue case

III. Legal accountability of the paramedic
- A. Responsible to act in a reasonable and prudent manner
- B. Responsible to provide a level of care and transportation consistent with education/ training
- C. Negligence can result in legal accountability and liability
  1. Components of negligence
     - a. Duty to act
       - (1) May be a formal contractual or an informal duty
       - (2) Duty may be undertaken voluntarily by beginning to care for a patient
       - (3) Duties include
         - (a) Duty to respond and render care
         - (b) Duty to obey laws and regulations
         - (c) Duty to operate emergency vehicle reasonably and prudently
         - (d) Duty to provide care and transportation to the expected standard
         - (e) Duty to provide care and transportation consistent with the scope of practice and local medical protocols
         - (f) Duty to continue care and transportation through to its appropriate conclusion
     - b. Breach of duty
       - (1) Standard of care
         - (a) Exercising the degree of care, skill, and judgement which would be expected under like or similar circumstances by a similarly trained, reasonable paramedic in the location involved

- (b) Standard of care is established by court testimony and reference to published codes, standards, criteria and guidelines applicable to the situation
- (2) Breach of duty may occur by
  - (a) Malfeasance - performing a wrongful or unlawful act
  - (b) Misfeasance - performing a legal act in a manner which is harmful or injurious
  - (c) Non-feasance - failure to perform a required act or duty
- (3) In some cases, negligence may be so obvious that it does not require extensive proof
  - (a) Res ipsa loquitur - the injury could only have been caused by negligence
  - (b) Negligence per se - negligence is shown by the fact that a statute was violated and injury resulted

c. Damage to patient or other individual (i.e., the plaintiff)
- (1) Proof that the plaintiff suffered compensable physical or psychological damages, such as
  - (a) Medical expenses
  - (b) Lost earnings
  - (c) Conscious pain and suffering
  - (d) Wrongful death
- (2) Punitive (punishing) damages could be awarded
  - (a) Awarded to punish gross negligence or willful and wanton misconduct
  - (b) Punitive damages are usually not covered by malpractice insurance

d. Proximate cause
- (1) The action or inaction of the paramedic was the cause of or worsened the damage
- (2) The fact that the paramedic's act or inaction would result in the damage must have been reasonably foreseeable by the paramedic
- (3) Usually established by expert testimony

2. Defenses to negligence

a. Good Samaritan laws
- (1) Do not generally protect providers from acts of gross negligence, reckless disregard, or willful or wanton conduct
- (2) Do not generally prohibit the filing of a lawsuit
- (3) May provide coverage for paid or volunteer providers
- (4) Varies from state to state

b. Governmental immunity
- (1) Trend is toward limiting protection
- (2) May only protect governmental agency, not provider
- (3) Varies from state to state

c. Statute of limitations
- (1) Limit the number of years after an incident during which a lawsuit can be filed
- (2) Set by law and may differ for cases involving adults and children
- (3) Varies from state to state

d. Contributory negligence
- (1) Plaintiff may be found to have contributed to his or her own injury

- (2) Damages awarded may be reduced or eliminated based on the plaintiff's contribution to his or her injury
- e. Liability insurance

D. Special liability concerns
- 1. Liability of the paramedic medical director
  - a. On-line - direct supervision regarding patient care
  - b. Off-line
    - (1) Provided by use of protocols, including standing orders
    - (2) Indirect supervision
- 2. Liability for "borrowed servants"
  - a. Liability for actions of EMT-Basic supervised by the paramedic
  - b. Depends on degree of supervision and control given to the paramedic
- 3. Civil rights
  - a. May not discriminate in providing service to a patient by reason of race, color, sex, national origin, or, in some cases, ability to pay
  - b. Patients should be provided with appropriate care regardless of disease condition (e.g., AIDS/ HIV, other communicable disease, etc.)
- 4. Off-duty paramedic
  - a. May not have authority to perform paramedic procedures which require delegation from a physician
  - b. Varies from state to state

E. Protection against negligence claims
- 1. Appropriate education/ training and continuing education
- 2. Appropriate medical direction -- on- and off-line
- 3. Accurate, thorough documentation
- 4. Professional attitude and demeanor

IV. Paramedic - patient relationships

A. Confidentiality
- 1. Confidential information
  - a. Patient history
  - b. Assessment findings
  - c. Treatment rendered
- 2. Release of information
  - a. Requires written permission from patient or legal guardian
  - b. Permission not required for release of select information
    - (1) To other providers with a need to know in order to provide care
    - (2) When required by law
    - (3) When required for third party billing
    - (4) In response to a proper subpoena
- 3. Improper release of information or release of inaccurate information can result in liability
  - a. Invasion of privacy
    - (1) Release, without legal justification, of information on a patient's private life which might reasonably expose the individual to ridicule, notoriety or embarrassment
    - (2) The fact that the information is true is not a defense
  - b. Defamation - making an untrue statement about someone's character or reputation without legal privilege or consent of the individual
    - (1) Libel

- (a) False statements about a person made in writing or through the mass media
- (b) Made with malicious intent or reckless disregard for the falsity of the statements

(2) Slander

- (a) False verbal statements about a person
- (b) Made with malicious intent or reckless disregard for the falsity of the statements

B. Consent

1. Conscious, competent patients have the right to decide what medical care and transportation to accept
   - a. Patient must be of legal age and able to make a reasoned decision
   - b. Patient must be properly informed
     - (1) Nature of the illness or injury
     - (2) Treatment recommended
     - (3) Risks and dangers of treatment
     - (4) Alternative treatment possible and the risks
     - (5) Dangers of refusing treatment (including transport)
   - c. Conscious, competent patient can revoke consent at any time during care and transport
2. Types of consent
   - a. Expressed consent
     - (1) Patient directly agrees to treatment and gives permission to proceed
     - (2) Consent can be expressed non-verbally by action or allowing care to be rendered
   - b. Informed consent - consent given based on full disclosure of information
   - c. Implied consent
     - (1) Consent assumed from a patient requiring emergency intervention who is mentally, physically or emotionally unable to provide expressed consent; sometimes called emergency doctrine
     - (2) Is effective only until patient no longer requires emergency care or regains competence to make decisions
   - d. Involuntary consent
     - (1) Treatment allowed in certain situations granted by authority of law
     - (2) Patients held for mental health evaluation or as directed by law enforcement personnel who have the patient under arrest
3. Special consent situations
   - a. Minors
     - (1) In most states, a person is a minor until age 18, unless emancipated
     - (2) Emancipation may include
       - (a) Minors who are married, parents, or in the armed services
       - (b) Individual living independently and self-supporting (e.g., college student not living at home or receiving financial aid from parents)
     - (3) Unemancipated minors are not able to give or withhold consent - consent of parent, legal guardian or court-appointed custodian is usually required
     - (4) Emergency doctrine applies to minors when parent or guardian cannot be contacted
   - b. Mentally incompetent adults

- (1) If there is a legal guardian, consent may be given or withheld by the guardian
- (2) Emergency doctrine applies if no one legally able to give consent can be contacted

c0 Prisoners or arrestees

- (1) Court or police who have custody may authorize emergency treatment
- (2) Usually limited to care needed to save life or limb

d0 Refusal of care or transport

- (1) Patient must be conscious and able to make a reasonable decision
- (2) Make multiple attempts to convince the patient to accept care
- (3) Enlist the help of others to convince the patient
- (4) Assure that the patient is informed about the implication of the decision and potential for harm
- (5) Consult medical direction
- (6) Request patient and a disinterested witness to sign a "release from liability" form
- (7) Advise the patient that he or she may call again for help if needed
- (8) Attempt to get family or friends to stay with the patient
- (9) Document situation and actions thoroughly on patient care report

e0 Decisions not to transport

- (1) Involve medical direction
- (2) Thoroughly document reasons for decision

4 Legal complications related to consent

a0 Abandonment

- (1) Terminating care when it is still needed and desired by the patient, and without assuring that appropriate care continues to be provided by another qualified provider
- (2) May occur in the field or when a patient is delivered to the emergency department

b0 False imprisonment

- (1) May be charged by a patient who is transported without consent or who is restrained without proper cause or authority
- (2) May be a civil or criminal violation

c0 Assault

- (1) Threatening, attempting or causing fear of offensive physical contact with a patient or other individual (for example, threatening to restrain a patient unless he or she quiets down)
- (2) May be a civil or criminal violation

d0 Battery

- (1) Unlawful touching of another person without consent (for example, drawing a patient's blood without permission)
- (2) May be a civil or criminal violation

C0 Use of force

1 Unruly or violent patients

2 Use of restraints

3 Involve law enforcement, if possible

4 Use only force considered to be “reasonable” to prevent harm to the patient or others

5 Must never be punitive

- **D0 Transportation of patients**
  - **1 Level of care during transportation**
    - **a0 Level of personnel attending the patient**
    - **b0 Complications resulting from changing the level of care delivered**
  - **2 Use of emergency vehicle operating privileges**
    - **a0 Must operate in conformity to laws, regulations and policies**
    - **b0 Must operate in a manner which safeguards the patient, crew and public**
  - **3 Choice of patient destination**
    - **a0 Hospitals selected based on patient need and hospital capability**
    - **b0 Protocols, the paramedic, medical direction, and patient play a role**
    - **c0 Patients choice should be honored unless situation or patient's condition dictates otherwise**
  - **4 Payor protocols**

- **V Resuscitation issues**
  - **A0 Withholding or stopping resuscitation**
    - **1 Procedure should be established by local protocols**
    - **2 Role of medical direction should be clearly delineated**
  - **B0 Advance directives**
    - **1 Status depends on state laws and local protocols**
    - **2 Written patient statements of preference for future medical treatment**
      - **a0 Living will**
      - **b0 Durable power of attorney for health care**
      - **c0 Do not resuscitate (DNR) orders**
    - **3 Authority granted in part by the Patient Self-Determination Act of 1990**
    - **4 Medical direction must establish and implement policies for dealing with advance directives**
      - **a0 Policy should specify paramedic care for the patient with an advance directive**
      - **b0 Must provide for reasonable measures of comfort to the patient and emotional support to family and loved ones**
  - **C0 Potential organ donation**
    - **1 Identify the patient as a potential donor**
    - **2 Establish communication with medical direction**
    - **3 Provide emergency care that will help maintain viable organs**
  - **D0 Death in the field**
    - **1 Follow state or local protocols**
    - **2 Consult medical direction for guidance**

- **VI Crime and accident scene responsibilities**
  - **A0 Crime scene**
    - **1 Protect self and other EMS personnel**
    - **2 Care for the patient(s) as necessary**
    - **3 Notify law enforcement if not already involved**
    - **4 Observe and document any items moved or anything unusual at the scene**
    - **5 Protect potential evidence**
      - **a0 Leave holes in clothing from bullet or stab wounds intact, if possible**
      - **b0 Do not touch or move items at scene unless necessary in delivery of care**
  - **B0 Accident scene**
    - **1 Protect self and other EMS personnel**

- 2 Care for the patient(s) as necessary
- 3 Summon additional personnel if needed

VII Documentation

- **A0 Importance**
  - 1 If it is not written down, it was not done.
  - 2 Memory is fallible - claims may not be filed until years after an event
- **B0 Characteristics of an effective patient care report**
  - 1 Completed promptly
    - a0 A report made "in the course of business", not long after the event
    - b0 Prompt completion essential to the patient care report becoming part of the hospital record
  - 2 Completed thoroughly
    - a0 Coverage of assessment, treatment and other relevant facts
    - b0 Should paint a complete, clear picture of patient condition and care
  - 3 Completed objectively
    - a0 Observations rather than assumptions or conclusions
    - b0 Avoid use of emotionally and value-loaded words or phrases
  - 4 Completed accurately
    - a0 Descriptions should be as precise as possible
    - b0 Avoid using abbreviations or jargon not commonly understood
  - 5 Confidentiality maintained
    - a0 Should have a standard policy on release of information
    - b0 Whenever possible, patient consent should be obtained prior to release of information
- **C0 Copy to become part of patient's hospital record**
- **D0 Maintained at least for extent of statute of limitations**

UNIT TERMINAL OBJECTIVE

1-5 At the completion of this unit, the paramedic student will understand the role that ethics plays in decision making in the out-of-hospital environment.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-5.1 Define ethics. (C-1)
1-5.2 Distinguish between ethical and moral decisions. (C-3)
1-5.3 Identify the premise that should underlie the paramedic's ethical decisions in out-of hospital care. (C-1)
1-5.4 Analyze the relationship between the law and ethics in EMS. (C-3)
1-5.5 Compare and contrast the criteria that may be used in allocating scarce EMS resources. (C-3)
1-5.6 Identify the issues surrounding the use of advance directives, in making a prehospital resuscitation decision. (C-1)
1-5.7 Describe the criteria necessary to honor an advance directive in your state. (C-1)

AFFECTIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-5.8 Value the patient's autonomy in the decision-making process. (A-2)
1-5.9 Defend the following ethical positions: (A-3)
- **a. The paramedic is accountable to the patient.**
- **b. The paramedic is accountable to the medical director.**
- **c. The paramedic is accountable to the EMS system.**
- **d. The paramedic is accountable for fulfilling the standard of care.**

1-5.10 Given a scenario, defend or challenge a paramedic's actions concerning a patient who is treated against his/ her wishes. (A-3)
1-5.11 Given a scenario, defend a paramedic's actions in a situation where a physician orders therapy the paramedic feels to be detrimental to the patient's best interests. (A-3)

PSYCHOMOTOR OBJECTIVES

None identified for this unit.

DECLARATIVE

I. Introduction
- **A. Ethical dilemmas are present in out-of-hospital care**
- **B. Ethical dilemma today may be decided by law tomorrow**

II. Ethics overview
- **A. Ethics defined**
  - **1. Socrates: "How should one live?"**
  - **2. Larger issue than paramedic practice**
  - **3. Morals relate to social standards**
  - **4. Ethics relate to personal standards**
- **B. Answering ethical questions**
  - **1. Emotion should not be a factor**
  - **2. The question should be answered with reason**
  - **3. Answer must not be based on what people think is wrong or right**
    - **a) The individual must answer the question for him/ her self**
  - **4. Never do what is morally wrong**
- **C. The need for an out-of-hospital ethical code**
- **D. How ethics impact individual practice**
  - **1. A personal code**
  - **2. The importance of reflecting on one's own practice.**
    - **a) "An unexamined life is not worth living"**
- **E. How ethics impact institutional practice**

III. Ethical tests in healthcare
- **A. Fundamental question**
  - **1. What is in the patient's best interest?**
  - **2. Determining what the patient wants**
    - **a) Patient statement**
    - **b) Written statement**
    - **c) Family input**
  - **3. The role of "good faith" in making ethical decisions**
- **B. Global concepts**
  - **1. Provide patient benefit**
  - **2. Avoid harm**
  - **3. Recognize patient autonomy**
- **C. Resolving ethical dilemmas when global concepts are in conflict**
  - **1. Within healthcare community**
    - **a) Establishment of norms (standards of care)**
    - **b) Research and treatment protocols**
    - **c) Prospective and retrospective reviews of decisions**
  - **2. Within the public**
    - **a) Creation of laws protecting patient rights**
    - **b) Use of advance directives, etc. to make patient wishes known**

IV. Ethical issues in contemporary paramedic practice
- **A. Allocation of resources**
  - **1. True parity**
  - **2. Need**
  - **3. Earned**

- **B. Decisions surrounding resuscitation**
  - **1. What the patient really wants**
  - **2. When in doubt, resuscitate**
  - **3. Resuscitation after an advance directive is found**
- **C. Confidentiality**
  - **1. A fundamental right**
  - **2. Ethics and confidential information**
    - **a) Legally required**
      - **(1) Does this supersede ethical considerations?**
      - **(2) What if the public health would benefit?**
- **D. Consent**
  - **1. Patient right to make decisions regarding health care**
    - **a) "Fundamental element of the patient-physician relationship"**
    - **b) AMA code of medical ethics**
  - **2. Ethics of implied consent**
    - **a) Does the patient understand the issues at hand?**
    - **b) Can the patient make an informed decision in his/ her best interest**
- **E. Applications of ethical principles to patient care situations**
  - **1. Care in futile situations**
    - **a) Defining futile**
    - **b) Who makes the decision?**
  - **2. Obligation to provide care**
    - **a) Good Samaritan**
    - **b) Inability to pay**
    - **c) Isn't in the "health plan"**
    - **d) Patient "dumping"**
    - **e) Economic triage**
  - **3. Advocacy**
  - **4. Paramedic accountability**
    - **a) Patient**
    - **b) Physician medical director**
    - **c) System/ HMO protocols**
  - **5. Role as physician extender**
    - **a) The physician orders something which**
      - **(1) The paramedic believes is contraindicated**
      - **(2) The paramedic believes is medically acceptable but not in the patient's best interests**
      - **(3) The paramedic believes is medically acceptable but morally wrong**

UNIT TERMINAL OBJECTIVE

1-6 At the completion of this unit, the paramedic student will be able to apply the general concepts of pathophysiology for the assessment and management of emergency patients.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-6.1 Discuss cellular adaptation. (C-1)
1-6.2 Describe cellular injury and cellular death. (C-1)
1-6.3 Describe the factors that precipitate disease in the human body. (C-1)
1-6.4 Describe the cellular environment. (C-1)
1-6.5 Discuss analyzing disease risk. (C-1)
1-6.6 Describe environmental risk factors. (C-1)
1-6.7 Discuss combined effects and interaction among risk factors. (C-1)
1-6.8 Describe aging as a risk factor for disease. (C-1)
1-6.9 Discuss familial diseases and associated risk factors. (C-1)
1-6.10 Discuss hypoperfusion. (C-1)
1-6.11 Define cardiogenic, hypovolemic, neurogenic, anaphylactic and septic shock. (C-1)
1-6.12 Describe multiple organ dysfunction syndrome. (C-1)
1-6.13 Define the characteristics of the immune response. (C-1)
1-6.14 Discuss induction of the immune system. (C-1)
1-6.15 Discuss fetal and neonatal immune function. (C-1)
1-6.16 Discuss aging and the immune function in the elderly. (C-1)
1-6.17 Describe the inflammation response. (C-1)
1-6.18 Discuss the role of mast cells as part of the inflammation response. (C-1)
1-6.19 Describe the plasma protein system. (C-1)
1-6.20 Discuss the cellular components of inflammation. (C-1)
1-6.21 Describe the systemic manifestations of the inflammation response. (C-1)
1-6.22 Describe the resolution and repair from inflammation. (C-1)
1-6.23 Discuss the effect of aging on the mechanisms of self-defense. (C-1)
1-6.24 Discuss hypersensitivity. (C-1)
1-6.25 Describe deficiencies in immunity and inflammation. (C-1)
1-6.26 Describe homeostasis as a dynamic steady state. (C-1)
1-6.27 List types of tissue. (C-1)
1-6.28 Describe the systemic manifestations that result from cellular injury. (C-1)
1-6.29 Describe neuroendocrine regulation. (C-1)
1-6.30 Discuss the inter-relationships between stress, coping, and illness. (C-1)

AFFECTIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-6.31 Advocate the need to understand and apply the knowledge of pathophysiology to patient assessment and treatment. (A-2)

PSYCHOMOTOR OBJECTIVES

None identified for this unit.

DECLARATIVE

- **I. Introduction**
  - **A. Correlation of pathophysiology with disease process**
    - **1. Cells appear similar to multicellular "social" organism**
    - **2. Cells communicate electrochemically - when interrupted disease processes can initiate and advance**
    - **3. Knowledge of coordination of specific bodily functions leads to better understanding of the disease process**
      - **a. Endocrine**
      - **b. Exocrine**
      - **c. Other coordinating receptors**
        - **(1) Chemoreceptors**
        - **(2) Baroreceptors**
        - **(3) Adrenergic**
        - **(4) Others**
  - **B. Correlation of disease process with care provided to patients by paramedics**
    - **1. Understanding disease process is important for paramedics to better understand, anticipate, correct, and provide appropriate care**
      - **a. Once knowledge of physical laws and principles have been gained paramedics can apply these to the mechanisms and complications of disease**
      - **b. Cells of the immune system and inflammatory responses are found with every type of trauma or disease process**

- **II. Basic cellular review**
  - **A. Major classes of cells - living cells divided into two major divisions**
  - **B. Chief cellular functions**
    - **1. Cells become specialized through process of differentiation, or maturation**
    - **2. Eventually perform one function or act in concert with other cells to perform a more complex task**
  - **C. Cellular components**
    - **1. Structure & function**
    - **2. Three main components**
  - **D. Tissue types**
    - **1. Epithelial tissue**
    - **2. Connective tissue**
    - **3. Muscle tissue**
    - **4. Nervous tissue**

- **III. Alterations in cells and tissues**
  - **A. Cellular adaptation - cells adapt to their environment to avoid and protect themselves from injury; adapted cells are neither normal or injured (they are somewhere between these two states)**
    - **1. Cellular adaptations are common and a central part of many disease states**
      - **a. Early stages of a successful adaptation response may enhance the cell's function**
      - **b. Difficult to determine pathological responses versus an extreme adaptation to an excessive functional demand**
    - **2. Atrophy**

- 3. Hypertrophy
- 4. Hyperplasia
- 5. Dysplasia
- 6. Metaplasia

B. Cellular injury

- 1. Hypoxic injury
  - a. Most common cause of cellular injury
  - b. May result from
    - (1) Decreased amounts of oxygen in the air
    - (2) Loss of hemoglobin or hemoglobin function
    - (3) Decreased number of red blood cells
    - (4) Disease in respiratory or cardiovascular system
    - (5) Loss of cytochromes
- 2. Chemical injury
  - a. Chemical agents causing cellular injury
    - (1) Poisons
    - (2) Lead
    - (3) Carbon monoxide
    - (4) Ethanol
    - (5) Pharmacological
- 3. Infectious injury
  - a. Virulence or pathogenicity of microorganisms depends on their ability to survive and reproduce in the human body, where they injure cells and tissues
    - (1) Disease producing potential depends upon its ability to
      - (a) Invade and destroy cells
      - (b) Produce toxins
      - (c) Produce hypersensitivity reactions
  - b. Bacteria
    - (1) Survival and growth depend upon the effectiveness of the body's defense mechanisms and the bacteria's ability to resist the mechanisms
      - (a) Coating protects the bacterium from ingestion and destruction by phagocytes and capsules may also function as exotoxins
      - (b) Not all virulent extracellular pathogens are encapsulated - mycobacterium tuberculosis can survive and be transported by phagocytes
    - (2) Bacteria also produce substances such as enzymes or toxins which can injure or destroy cells
      - (a) Toxins are produced by many microorganisms
        - i) Exotoxins
        - ii) Endotoxins
      - (b) Fever is caused by the release of endogenous pyrogens from macrophages or circulating white blood cells that are attracted to the injury site
      - (c) Inflammation is one of the body's responses to the presence of bacteria
      - (d) Ability to produce hypersensitivity reactions is an important pathogenic mechanism of bacteria toxins
      - (e) Bacteremia or septicemia is proliferation of microorganisms in the blood

- c. Viruses
  - (1) Viral disease are among the most common afflictions seen in humans
  - (2) Intracellular parasites that take over the control of metabolic machinery of host cells for use to replicate the virus
  - (3) Protein coat (capsid) encapsulating most viruses allows them to resist phagocytosis
  - (4) Viral replication occurs within the host cell
  - (5) Having no organelles, viruses are incapable of metabolism
  - (6) Causes decreased synthesis of macromolecules vital to the host cell
  - (7) Viruses do not produce exotoxins or endotoxins
  - (8) There may be a symbiotic relationships between viruses and normal cells resulting in a persistent unapparent infection
  - (9) Viruses can evoke a strong immune response but can rapidly produce irreversible and lethal injury in highly susceptible cells (as in AIDS)
- 4. Immunologic and inflammatory injury
  - a. Cellular membranes are injured by direct contact with cellular and chemical components of the immune or inflammatory process as in phagocytes (lymphocytes and macrophages) and others such as histamine, antibodies, lymphokines
  - b. Membrane alterations are associated with rapid leakage of potassium out of the cell and an influx of water
- 5. Injurious genetic factors
- 6. Injurious nutritional imbalances
- 7. Injurious physical agents

C. Manifestations of cellular injury
- 1. Cellular manifestations
- 2. Systemic manifestations

D. Cellular death/ necrosis

IV. The cellular environment

A. Distribution of body fluids
- 1. Intracellular fluid (ICF)
- 2. Extracellular fluid (ECF)
  - a. Interstitial fluid
  - b. Intravascular fluid
  - c. Other
- 3. Total body water (TBW)

B. Aging and distribution of body fluids
- 1. Birth
- 2. Infancy
- 3. Childhood
- 4. Adulthood
- 5. Elderly

C. Water movement between ICF and ECF
- 1. Osmotic forces
- 2. Role of sodium and potassium

D. Water movement between plasma and interstitial fluid
- 1. Osmotic forces within capillary bed
- 2. Starling's hypothesis
- 3. Role of capillary and membrane permeability

- **E. Alterations in water movement**
  - **1. Edema**
    - **a. Pathophysiology**
      - **(1) Increased capillary permeability**
      - **(2) Decreased oncotic pressure**
      - **(3) Increased capillary hydrostatic pressure**
      - **(4) Hydrostatic pressure**
      - **(5) Lymphatic vessel obstruction**
    - **b. Clinical manifestations**
      - **(1) Local**
      - **(2) Generalized**
    - **c0 Evaluation and treatment**
- **F0 Water balance and the role of electrolytes**
  - **1 Water balance**
    - **a0 Role of antidiuretic hormone (ADH)**
    - **b0 Receptors**
      - **(1) Osmoreceptors**
      - **(2) Volume sensitive receptors**
      - **(3) Baroreceptors**
  - **2 Sodium and chloride balance**
    - **a0 Role and function of sodium as a cation**
    - **b0 Role and function of chloride as an anion**
    - **c0 Hormone regulation by aldosterone and natriuretic hormone**
    - **d0 Role of renin-angiotensin system**
  - **3 Alterations in sodium, chloride, and water balance**
    - **a0 Isotonic alterations**
      - **(1) Isotonic volume depletions**
      - **(2) Isotonic volume excesses**
    - **b0 Hypertonic alterations**
      - **(1) Hypernatremia**
      - **(2) Water deficit**
      - **(3) Hyperchloremia**
    - **c0 Hypotonic alterations**
      - **(1) Hyponatremia**
      - **(2) Water excess**
      - **(3) Hypochloremia**
  - **4 Alterations in potassium, calcium, phosphate, and magnesium balance**
    - **a0 Potassium**
      - **(1) Hypokalemia**
      - **(2) Hyperkalemia**
    - **b0 Calcium and phosphate**
      - **(1) Hypocalcemia**
      - **(2) Hypercalcemia**
      - **(3) Hypophosphatemia**
      - **(4) Hyperphosphatemia**
    - **c0 Magnesium**
      - **(1) Hypomagnesemia**
      - **(2) Hypermagnesemia**
- **G0 Acid - base balances**
  - **1 Hydrogen ion and pH**

- **2 Buffer systems**
  - **a0 Carbonic acid-bicarbonate buffering**
  - **b0 Protein buffering**
  - **c0 Renal buffering**
  - **d0 Other buffers**
- **3 Acid-base imbalances**
  - **a0 Metabolic acidosis**
    - **(1) Pathophysiology**
    - **(2) Clinical presentation**
    - **(3) Evaluation and treatment**
  - **b0 Metabolic alkalosis (rare)**
    - **(1) Pathophysiology**
    - **(2) Clinical presentation**
    - **(3) Evaluation and treatment**
  - **c0 Respiratory acidosis**
    - **(1) Pathophysiology**
    - **(2) Clinical presentation**
    - **(3) Evaluation and treatment**
  - **d0 Respiratory alkalosis**
    - **(1) Pathophysiology**
    - **(2) Clinical presentation**
    - **(3) Evaluation and treatment**

V Genetics and familial diseases

- **A0 Factors causing disease**
  - **1 Genetic**
  - **2 Environmental**
    - **a0 Microoganisms and immunologic exposures**
    - **b0 Personal habits and life-style**
    - **c0 Chemical substances**
    - **d0 Physical environment**
    - **e0 Psychosocial environment**
  - **3 Age and gender**
    - **a0 Accumulative affects of both genetic and environmental factors**
    - **b0 Life-style, anatomic, or hormonal differences**
- **B0 Analyzing disease risk**
  - **1 Disease rates**
    - **a0 Incidence rate**
    - **b0 Prevalence rate**
    - **c0 Mortality rate**
  - **2 Risk factor analysis**
    - **a0 Causal risk factors**
    - **b0 Noncausal risk factors**
- **C0 Combined effects and interaction among risk factors**
  - **1 Familial disease tendency**
  - **2 Aging and age-related disorders**
- **D0 Common familial disease and associated risk factors**
  - **1 Immunologic disorders**
    - **a0 Allergies**
    - **b0 Asthma**

- c0 Rheumatic fever
- 2 Cancer
  - a0 Breast cancer
  - b0 Colorectal cancer
  - c0 Lung cancer
- 3 Endocrine disorders
  - a0 Diabetes mellitus
    - (1) Insulin-dependent diabetes mellitus
    - (2) Non-insulin dependent diabetes mellitus
- 4 Hematologic disorders
  - a0 Drug-induced hemolytic anemia
  - b0 Hemophilia
  - c0 Hematochromatosis
- 5 Cardiovascular disorders
  - a0 Long QT syndrome (autosomal dominant disorder)
  - b0 Cardiac myopathies
  - c0 Mitral valve prolapse
  - d0 Coronary heart disease
    - (1) Family history and CHD risk
    - (2) Genetic factors and predisposition
  - e0 Hypertension and stroke
- 6 Renal disorders
  - a0 Gout (uric acid accumulation)
  - b0 Kidney stones
- 7 Gastrointestinal disorders
  - a0 Malabsorption disorders
    - (1) Lactose intolerance
    - (2) Ulcerative colitis
    - (3) Crohn's disease
  - b0 Peptic ulcers
  - c0 Gallstones
  - d0 Obesity
    - (1) Associated disease processes
    - (2) Causal risk factors
- 8 Neuromuscular disorders
  - a0 Huntington disease
  - b0 Muscular dystrophy
  - c0 Multiple sclerosis
  - d0 Alzheimer disease
- 9 Psychiatric disorders
  - a0 Schizophrenia
  - b0 Manic-depressive

VI Hypoperfusion

- A0 Pathogenesis
  - 1 Decreased cardiac output
  - 2 Compensatory mechanisms
    - a0 Catecholamine release
      - (1) Epinephrine and norepinephrine
      - (2) Increase in systemic vascular resistance

- b0 Role of aldosterone renin-angiotensin, and ADH
  - (1) Adequate or increased blood volume
  - (2) Vasoconstriction increases systemic blood pressure
- c0 Shift of interstitial fluid
- d0 Splenic discharge

3 Increased preload, stroke volume, and heart rate

- a0 Increased myocardial oxygen demand
- b0 Systemic and pulmonary edema
  - (1) Dyspnea
  - (2) Dusky skin color
  - (3) Low blood pressure
  - (4) Oliguria
  - (5) Impaired mentation
- c0 Decreased cardiac output and ejection fraction
  - (1) Decreased blood pressure
  - (2) Decreased tissue perfusion
  - (3) Impaired cellular metabolism

B0 Types of Shock

1 Cardiogenic shock

- a0 Defined
- b0 Pathophysiology
- c0 Evaluation and treatment

2 Hypovolemic shock

- a0 Defined
- b0 Pathophysiology
- c0 Evaluation and treatment

3 Neurogenic shock

- a0 Defined
- b0 Pathophysiology
- c0 Evaluation and treatment

4 Anaphylactic shock

- a0 Defined
- b0 Pathophysiology
- c0 Evaluation and treatment

5 Septic Shock

- a0 Defined
- b0 Pathophysiology
- c0 Evaluation and treatment

C0 Multiple organ dysfunction syndrome (MODS)

1 Defined

- a0 Progressive failure of two or more organ systems
- b0 Occurs after severe illness or injury
- c0 New diagnosis first described in 1975
- d0 Mortality rate of 60% - 90%
- e0 Major cause of death following septic, traumatic, and burn injuries

2 Pathophysiology

- a0 Injury or endotoxin release
- b0 Vascular endothelial damage, neuroendocrine response, and release of inflammatory mediators
- c0 Activation of complement, coagulation, and kallikrein/ kinin systems

- **d0 Massive systemic immune/ inflammatory and coagulation responses**
- **e0 Vascular changes**
  - **(1) Vasodilation**
  - **(2) Increase in capillary permeability**
  - **(3) Selective vasoconstriction**
  - **(4) Microvascular thrombi**
- **f0 Maldistribution of systemic and organ blood flow**
- **g0 Hypermetabolism**
- **h0 Oxygen supply/ demand imbalance**
- **i0 Tissue hypoxia**
  - **(1) Tissue hypoperfusion**
  - **(2) Exhaustion of fuel supply (i.e. ATP, glucose, etc)**
  - **(3) Metabolic failure**
  - **(4) Lysosome breakdown**
  - **(5) Anaerobic metabolism**
  - **(6) Acidosis and impaired cellular function**
- **j0 Organ dysfunction**
  - **(1) Decreased cardiac function and myocardial depression**
  - **(2) Renal failure**
  - **(3) Failure of smooth muscle of vascular system**
    - **(a) Release of capillary sphincters**
    - **(b) Vasodilation**

3 Clinical presentation - 24 hours after initial resuscitation

- **a0 Low-grade fever due to inflammatory responses**
- **b0 Tachycardia**
- **c0 Dyspnea and adult respiratory distress syndrome (ARDS)**
- **d0 Altered mental status**
- **e0 Hyperdynamic state**
- **f0 Hypermetabolic states**
- **g0 Renal and liver failure (14 - 21 days)**
- **h0 Gastrointestinal and immune collapse (14 - 21 days)**
- **i0 Cardiovascular collapse and death (21 - 28 days)**

D0 Cellular metabolism impairment

1 Oxygen impairment

- **a0 Anaerobic metabolism**
- **b0 Increased lactate**
- **c0 Metabolic acidosis**
- **d0 Decreased oxygen affinity for hemoglobin**
- **e0 Decreased ATP**
- **f0 Changes in cellular electrolytes**
- **g0 Cellular edema**
- **h0 Release of lysosomal enzymes**

2 Impaired glucose use

- **a0 Increase serum glucose**
- **b0 Catecholamines, cortisol, growth hormone release**
- **c0 Increased gluconeogenesis, gluconeolysis, and lipolysis**

VII Self-defense mechanisms

A0 Introduction - lines of defense

1 Anatomic barriers

- 2 Inflammatory response
- 3 Immune response

B0 Characteristics of the immune response

- 1 Natural versus acquired immunity
  - a0 Natural or native immunity
  - b0 Acquired immunity
    - (1) Active acquired immunity
    - (2) Passive acquired immunity
- 2 Primary versus secondary immunity
  - a0 Primary or initial immune response
  - b0 Secondary or anamnestic immune response
- 3 Humoral versus cell-mediated immunity
  - a0 B-cell lymphocyte
  - b0 T-cell lymphocyte

C0 Induction of the immune response

- 1 Antigens and immunogens
  - a0 Antigens
  - b0 Immunogen
  - c0 Tolerance
  - d0 Molecular size
    - (1) Larger - proteins, polysaccharides, and nucleic acids
    - (2) Smaller - amino acids, monosaccharides, and fatty acids
    - (3) Haptens - smaller molecules which become immunogenic
- 2 Histocompatibility antigens (HLA antigens)
  - a0 HLA complexes or major histocompatibility complexes (MHC)
  - b0 Role of HLA antigens
- 3 Blood group antigens
  - a0 Rh system
  - b0 ABO system

D0 Humoral immune response

- 1 B-cell lymphocytes
  - a0 Formation
    - (1) Lymphoid stem cell
    - (2) Generation of clonal diversity
    - (3) Clonal selection
    - (4) Activated B-cell
      - (a) Immunoglobulin-secreting plasma cells found in blood and secondary lymphoid organs
      - (b) Memory cells - responsible for long term immunity
- 2 Immunoglobulins
  - a0 Differences between immunoglobulins and antibodies
  - b0 Structure of immunoglobulin molecules
  - c0 Function of antibodies
    - (1) Agglutination
    - (2) Precipitation
    - (3) Neutralization
      - (a) Bacterial toxins
      - (b) Viruses
      - (c) Opsonization of bacteria
      - (d) Activation of inflammatory processes

- (e) Classes of immunoglobulins
- (f) Antibodies as antigens
- (4) Isotypic antigens
- (5) Allotypic antigens
- (6) Idiotypic antigenic determinants

d0 Monoclonal antibodies

3 Secretory immune system

a0 Mucosal-associated lymphoid tissue

- (1) Lacrimal glands
- (2) Salivary glands
- (3) Bronchial-associated lymphoid tissue
- (4) Mammary-associated lymphoid tissue
- (5) Gut-associated lymphoid tissue
- (6) Genital-associated lymphoid tissue

b0 Circulates independently of other lymphocytes

- (1) Mucosal-associated lymphoid tissue
- (2) Regional lymph nodes
- (3) Thoracic duct
- (4) Blood

c0 One of body's first lines of defense

d0 Occurs locally rather than systemically

E0 Cell-mediated immune response

1 T-cells

a0 Five types of mature T-cells

- (1) Memory cells
- (2) Td cells or lymphokine-producing cells
- (3) Tc cells or cytotoxic cells
- (4) Th cells or helper T-cells
- (5) Ts cells or suppressor T-cells

b0 Proliferation and differentiation

2 Major effects of cell-mediated immune response

a0 Cytotoxicity

b0 Delayed hypersensitivity

c0 Memory

d0 Control

F0 Cellular interactions in the immune response

1 Cytokines

a0 Lymphokines

b0 Monokines

2 Antigen processing, presentation, and recognition

a0 Antigen degradation

b0 Classes of histocompatible antigens (HLA)

c0 T-cell receptors

d0 Interleukin - 1 (IL-1)

3 T-cell and B-cell differentiation

a0 T-cell differentiation

b0 B-cell differentiation

c0 Control of B and T-cell development

G0 Fetal and neonatal immune function

1 Fetal immunological capabilities

- a0 Immunologic responses
- b0 Antibody capabilities

2 Antibody levels
- a0 Umbilical cord blood
- b0 Neonatal circulation

3 Trophoblasts

H0 Aging and the immune response in elderly
1 T-cell function
2 Antibody production

VIII Inflammation

A0 The acute inflammatory response

1 Triggers
- a0 Lethal cellular injury
- b0 Non-lethal cellular injury
- c0 Other microorganisms

2 Response
- a0 Vascular responses to inflammation
- b0 Cellular responses to inflammation

B0 Mast cells

1 Degranulation of vasoactive amines and chemotactic factors
- a0 Stimulation of degranulation
  - (1) Physical injury
  - (2) Chemical agents
  - (3) Immunological (IgE-mediated hypersensitivity)
- b0 Vasoactive amines
  - (1) Histamine
  - (2) Serotonin
- c0 Chemotactic factors
  - (1) Neutrophil
  - (2) Eosinophil

2 Synthesis of leukotrienes and prostaglandins
- a0 Leukotrienes or slow-reacting substances of anaphylaxis (SRS-A)
  - (1) Composition
  - (2) Function
- b0 Prostaglandins
  - (1) Composition
  - (2) Function

C0 Plasma protein systems

1 Complement system
- a0 Structure and function
- b0 Activation
  - (1) Classic pathway
  - (2) Alternative pathway

2 Clotting system
- a0 Structure and function
- b0 Activation
  - (1 Extrinsic pathway
  - (2 Intrinsic pathway

3. Kinin system

- a. Structure and function
- b. Activation
  - (1 Plasma kinin cascade

4. Control and interaction of the plasma protein system
   - a. Reason for control
   - b. Types of control
     - (1 Antagonists
     - (2 Histamine control
     - (3 Interaction of control processes

D. Cellular components of inflammation

1. Functions of phagocytes
   - a. Margination
   - b. Diapedesis
   - c. Exudation into inflamed tissue
   - d. Process of phagocytosis
2. Polymorphonuclear neutrophils
   - a. Predominance in early inflammatory response
   - b. Role
3. Monocytes and macrophages
   - a. Monocyte - young macrophage
     - (1 Structure
     - (2 Role
   - b. Macrophages
     - (1 Structure
     - (2 Role
4. Eosinophils
   - a. Structure
   - b. Role

E. Cellular products

1. Interleukins (ILs)
   - a. Interleukin - 1
   - b. Interleukin - 2
2. Lymphokines
   - a. Production
   - b. Types and effects
     - (1 Migration-inhibitory factor
     - (2 Macrophage-activating factor
3. Interferon
   - a. Structure
   - b. Actions and effects

F. Systemic responses of acute inflammation

1. Fever
   - a. Activation
   - b. Effects
2. Leukocytosis
   - a. Activation
   - b. Effects
3. Increase in circulating plasma proteins or acute-phase reactants
   - a. Activation
   - b. Effects

- **G. Chronic inflammation responses**
  - **1. Causes**
    - **a. Unsuccessful acute inflammatory response due to foreign body**
    - **b. Persistence of infection or antigen**
  - **2. Characteristics**
    - **a. Persistence of acute inflammation response**
    - **b. Neutrophil degranulation and death**
    - **c. Lymphocyte activation**
    - **d. Fibroblast activation**
    - **e. Infiltration (pus)**
    - **f. Tissue repair (scar)**
- **H. Local inflammation responses**
  - **1. Vascular changes**
    - **a. Vasodilation**
    - **b. Increased capillary permeability**
  - **2. Exudation**
    - **a. Functions**
    - **b. Compositions**
- **I. Phases of resolution and repair**
  - **1. Definitions**
    - **a. Regeneration**
    - **b. Repair**
    - **c. Debridement**
    - **d. Primary intention**
    - **e. Secondary intention**
  - **2. Reconstruction phase**
    - **a. Initial wound response**
    - **b. Granulation**
    - **c. Epithelialization**
  - **3. Maturation Phase**
    - **a. Completion of contraction, differentiation, and remodeling of scar tissue**
    - **b. Disappearance of capillaries from scar tissue**
  - **4. Dysfunctional wound healing**
    - **a. Dysfunction during the inflammatory response**
    - **b. Dysfunction during the reconstruction phase**
      - **(1 Impaired collagen synthesis**
      - **(2 Impaired epithelialization**
      - **(3 Wound disruption**
      - **(4 Impaired contraction**
- **J. Aging and self-defense mechanisms**
  - **1. Newborn**
  - **2. Elderly**

- **IX. Variances in immunity and inflammation**
  - **A. Hypersensitivity: allergy, autoimmunity, and isoimmunity**
    - **1. Definitions**
      - **a. Hypersensitivity**
      - **b. Allergy**
      - **c. Autoimmunity**
      - **d. Isoimmunity**

- 2. Mechanisms of hypersensitivity
  - a. Immediate versus delayed reactions
  - b. IgE reactions
    - (1 Role of IgE
    - (2 Mechanism of IgE
    - (3 Clinical indications
    - (4 Genetic predisposition
    - (5 IgE-mediated hypersensitivity tests
    - (6 Desensitization
  - c. Tissue-specific reactions
    - (1 Tissue-specific antigens
    - (2 Mechanisms
  - d. Immune-complex mediated injury
    - (1 Mechanisms
    - (2 Immune-complex disease
  - e. Cell-mediated tissue destruction
    - (1 Mechanisms
    - (2 Clinical instances
- 3. Targets of hypersensitivity
  - a. Allergy
    - (1 Allergens
    - (2 Neoantigen
  - b. Autoimmunity
    - (1 Breakdown of tolerance
    - (2 Original insult
    - (3 Genetic factors
  - c. Isoimmunity
    - (1 Transient neonatal diseases
    - (2 Transplant rejections and transfusion reactions
- 4. Autoimmune and isoimmune diseases
  - a. Grave's disease
  - b. Rheumatoid arthritis
  - c. Myasthenia gravis
  - d. Immune thrombocytopenic purpura
  - e. Isoimmune neutropenia
  - f. Systemic lupus erythematosus (SLE)
  - g. Rh and ABO isoimmunization

B. Immunity and inflammation deficiencies

- 1. Congenital immune deficiencies
- 2. Acquired deficiencies
  - a. Nutritional deficiencies
  - b. Iatrogenic deficiencies
  - c. Deficiencies caused by trauma
  - d. Deficiencies caused by stress
  - e. AIDS
- 3. Replacement therapies for immune deficiencies
  - a. Gamma globulin therapy
  - b. Transplantation and transfusion
  - c. Gene therapy

- **X. Stress and disease**
  - **A. Concepts of stress**
    - **1. Triad of manifestations**
    - **2. General adaptation syndrome (Selye)**
      - **a. Alarm stage**
      - **b. Resistance or adaptation stage**
      - **c. Exhaustion stage**
      - **d. Definition of physiological stress**
    - **3. Psychologic mediators and specificity**
      - **a. Psychologic factors effects on physiological responses to stress**
      - **b. Pituitary gland and adrenal cortex sensitivity to emotional, psychologic and social influences**
    - **4. Homeostasis as a dynamic steady state**
      - **a. Definitions**
        - **(1 Dynamic steady state**
        - **(2 Turnover**
      - **b. Reaction of body to stressors**
  - **B. Stress responses**
    - **1. Psychoneuroimmunologic response**
      - **a. Interaction of consciousness, brain and central nervous system, and the body's defense mechanisms**
      - **b. Stress response**
    - **2. Neuroendocrine regulation**
      - **a. Catecholamines**
        - **(1 Components**
          - **(a Epinephrine**
          - **(b Norepinephrine**
        - **(2 Physiologic actions of alpha and beta receptors**
          - **(a $Alpha_1$**
          - **(b $Alpha_2$**
          - **(c $Beta_1$**
          - **(d $Beta_2$**
        - **(3 Physiologic effects of catecholamines**
          - **(a Brain**
          - **(b Cardiovascular**
          - **(c Pulmonary**
          - **(d Muscle**
          - **(e Liver**
          - **(f Adipose Tissue**
          - **(g Skin**
          - **(h Skeleton**
          - **(i G.I. and G.U. systems**
          - **(j Lymphoid tissue**
      - **b. Cortisol**
        - **(1 Source**
        - **(2 Primary effects of cortisol**
          - **(a Stimulation of glucogenesis**
          - **(b Formation of glycogen**
          - **(c Cortisol effects on cell-mediated immunity**
        - **(3 Other physiologic effects of cortisol**

- (a Protein metabolism
- (b Digestive function
- (c Urinary function
- (d Connective tissue function
- (e Muscle function
- (f Bone function
- (g Vascular system and myocardial function
- (h Central nervous system function

c. Other hormones
- (1 Endorphins
- (2 Growth hormone
- (3 Prolactin
- (4 Testosterone

d. Role of the immune system
- (1 Interaction of immune, nervous, and endocrine systems during a stress response
- (2 Influence of stress response on immune system
- (3 Relationship between stress and immune-related conditions and diseases
  - (a Cardiovascular
  - (b Muscles
  - (c Connective tissue
  - (d Pulmonary system
  - (e Immune system
  - (f G.I. system
  - (g G.U. system
  - (h Skin
  - (i Endocrine system
  - (j Central nervous system

C. Stress, coping, and illness interrelationships

1. Stress as interdependent processes
   - a. Definition of physiologic stress and psychologic distress
   - b. Effects of psychologic distress
   - c. Relationship between distress and immune dysfunction
2. Potential stress effects on
   - a. Healthy individuals
     - (1 Ineffective coping
     - (2 Effective coping
   - b. Symptomatic individuals
     - (1 Ineffective coping
     - (2 Effective coping
   - c. Medical interventions
     - (1 Ineffective coping
     - (2 Effective coping

REFERENCE

McCance, K.L., Heuther, S.E., (1994). ***Pathophysiology: The Biological Basis for Disease in Adults and Children*** **(2nd ed.) St. Louis: Mosby-Yearbook.**

UNIT TERMINAL OBJECTIVE

1-7 At the completion of this unit, the paramedic student will be able to integrate pathophysiological principles of pharmacology and the assessment findings to formulate a field impression and implement a pharmacologic management plan.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-7.1 Describe historical trends in pharmacology. (C-1)
1-7.2 Differentiate among the chemical, generic (nonproprietary), and trade (proprietary) names of a drug. (C-3)
1-7.3 List the four main sources of drug products. (C-1)
1-7.4 Describe how drugs are classified. (C-1)
1-7.5 List the authoritative sources for drug information. (C-1)
1-7.6 List legislative acts controlling drug use and abuse in the United States. (C-1)
1-7.7 Differentiate among Schedule I, II, III, IV, and V substances. (C-3)
1-7.8 List examples of substances in each schedule. (C-1)
1-7.9 Discuss standardization of drugs. (C-1)
1-7.10 Discuss investigational drugs, including the Food and Drug Administration (FDA) approval process and the FDA classifications for newly approved drugs. (C-1)
1-7.11 Discuss special consideration in drug treatment with regard to pregnant, pediatric and geriatric patients. (C-1)
1-7.12 Discuss the paramedic's responsibilities and scope of management pertinent to the administration of medications. (C-1)
1-7.13 Review the specific anatomy and physiology pertinent to pharmacology with additional attention to autonomic pharmacology. (C-1)
1-7.14 List and describe general properties of drugs. (C-1)
1-7.15 List and describe liquid and solid drug forms. (C-1)
1-7.16 List and differentiate routes of drug administration. (C-3)
1-7.17 Differentiate between enteral and parenteral routes of drug administration. (C-3)
1-7.18 Describe mechanisms of drug action. (C-1)
1-7.19 List and differentiate the phases of drug activity, including the pharmaceutical, pharmacokinetic, and pharmacodynamic phases. (C-3)
1-7.20 Describe the process called pharmacokinetics, pharmocodynamics, including theories of drug action, drug-response relationship, factors altering drug responses, predictable drug responses, iatrogenic drug responses, and unpredictable adverse drug responses. (C-1)
1-7.21 Differentiate among drug interactions. (C-3)
1-7.22 Discuss considerations for storing and securing medications. (C-1)
1-7.23 List the component of a drug profile by classification. (C-1)
1-7.24 List and describe drugs that the paramedic may administer according to local protocol. (C-1)
1-7.25 Integrate pathophysiological principles of pharmacology with patient assessment. (C-3)
1-7.26 Synthesize patient history information and assessment findings to form a field impression. (C-3)
1-7.27 Synthesize a field impression to implement a pharmacologic management plan. (C-3)
1-7.28 Assess the pathophysiology of a patient's condition by identifying classifications of drugs. (C-3)

AFFECTIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-7.29 Serve as a model for obtaining a history by identifying classifications of drugs. (A-3)
1-7.30 Defend the administration of drugs by a paramedic to affect positive therapeutic affect. (A-3)
1-7.31 Advocate drug education through identification of drug classifications. (A-3)

PSYCHOMOTOR OBJECTIVES

None identified for this unit.

DECLARATIVE

I. Historical trends in pharmacology
- **A. Ancient health care**
- **B. The pre- and post-renaissance period**
- **C. Modern health care**
- **D. The present period of change**
- **E. New trends in health care and pharmaceutics**
  1. **Expansion of consumer health education results from the consumer's motivation to take responsibility for their health and disease prevention**
  2. **Research is directed to discover new treatments, cures, or methods to prevent disease processes that limit growth, everyday living, or average life span**
  3. **Orphan drugs developed to treat rare and chronic diseases**

II. Names of drugs
- **A. Drugs - chemical agents used in the diagnosis, treatment, or prevention of disease**
- **B. Pharmacology - the study of drugs and their actions on the body**
- **C. Chemical name - a precise description of the drug's chemical composition and molecular structure**
- **D. Generic name or non-proprietary name**
  1. **Official name approved by the FDA**
  2. **Usually suggested by the first manufacturer**
- **E. Trade or proprietary name - the brand name registered to a specific manufacturer or owner**
- **F. Official name - the name assigned by USP**

III. Sources of drugs
- **A. Plants**
  1. **Alkaloids**
  2. **Glycosides**
  3. **Gums**
  4. **Oils**
- **B. Animals and humans**
- **C. Minerals or mineral products**
- **D. Chemical substances made in the laboratory**

IV. Drug Classification
- **A. Drugs are classified**
  1. **By body system**
  2. **Class of agent**
  3. **Mechanism of action**

V. Sources of drug information
- **A. AMA Drug Evaluation**
- **B. Physician's Desk Reference (PDR)**
- **C. Hospital Formulary (HF)**
- **D. Drug inserts**
- **E. Other texts, sources**

VI. United States drug legislation
- **A. Purpose for drug legislation**

1. To protect the public from adulterated or mislabeled drugs

B. History of drug legislation and its effects
   1. Pure Food and Drug Act, 1906
   2. Harrison Narcotic Act, 1914
   3. Federal Food, Drug, and Cosmetic Act, 1938

C. Food and Drug Administration

VII. Schedule of controlled substances

A. Controlled Substances Act, 1970 (Comprehensive Drug Abuse Prevention and Control Act, 1970)

B. Purpose for scheduling controlled substances, based upon abuse potential

C. Classification of drugs into numbered levels or schedules (I to V)

D. Schedules
   1. Schedule I
      a. High abuse potential
      b. No currently accepted medical use
         (1) For research, analysis, or instruction only
         (2) May lead to severe dependence
      c. Examples
         (1) Heroin
         (2) LSD
         (3) Mescaline
   2. Schedule II
      a. High abuse potential
      b. Accepted medical uses; may lead to severe physical and/ or psychological dependence
      c. Examples
         (1) Opium
         (2) Morphine
         (3) Codeine
         (4) Oxycodone
         (5) Methadone
         (6) Cocaine
         (7) Secobarbital
   3. Schedule III
      a. Less abuse potential than drugs in Schedules I and II
      b. Accepted medical uses - may lead to moderate/ low physical dependence or high psychologic dependence
      c. Examples
         (1) Preparations containing limited opioid quantities, or combined with one or more active ingredients that are noncontrolled substances
            (a) Acetaminophen with codeine
            (b) Aspirin with codeine
   4. Schedule IV
      a. Lower abuse potential compared to Schedule III
      b. Accepted medical uses - may lead to limited physical or psychological dependence
      c. Examples
         (1) Phenobarbital
         (2) Diazepam

- (3) Lorazepam
- 5. Schedule V
  - a. Low abuse potential compared to schedule IV
  - b. Accepted medical uses - may lead to limited physical or psychologic dependence
  - c. Examples
    - (1) Medications, generally for relief of coughs or diarrhea, containing limited quantities of certain opioid controlled substances

VIII. Standardization of drugs
- A. Standardization is a necessity
- B. Techniques for measuring a drug's strength and purity
  - 1. Assay
  - 2. Bioassay
- C. The Unites States Pharmacopeia (USP)
  - 1. Official volumes of drug standards
- D. Other reference books and guides

IX. Investigational drugs
- A. Prospective drugs may take years to progress through the FDA testing sequence
  - 1. Animal studies to ascertain
    - a. Toxicity
    - b. Therapeutic index
    - c. Modes of absorption, distribution, metabolism (biotransformation), and excretion
  - 2. Human studies
- B. FDA approval process
  - 1. Phases of investigation
  - 2. New drug application
  - 3. Abbreviated new drug application
- C. FDA classifications for newly approved drugs, 1992
  - 1. Numerical classification
  - 2. Letter classification

X. Special considerations in drug therapy
- A. Pregnant patients
  - 1. Before using any drug during pregnancy, the expected benefits should be considered against the possible risks to the fetus
  - 2. The FDA has established a scale (Categories A, B, C, D, and X) to indicate drugs that may have documented problems in animals and/ or humans during pregnancy
  - 3. Many drugs are unknown to cause problems in animals and/ or humans during pregnancy
  - 4. Pregnancy causes a number of anatomical and physiological changes
  - 5. Drugs may cross the placenta or through lactation
- B. Pediatric patients
  - 1. Based on the child's weight or body surface area
  - 2. Special concerns for neonates
  - 3. Length-based resuscitation tape
- C. Geriatric patients

1. The physiological effects of aging can lead to altered pharmacodynamics and pharmacokinetics

XI. The scope of management
- A. Paramedics are held responsible for safe and therapeutically effective drug administration
- B. Paramedics are personally responsible - legally, morally, and ethically - for each drug they administer
- C. Paramedics
  1. Use correct precautions and techniques
  2. Observe and document the effects of drugs
  3. Keep their knowledge base current to changes and trends in pharmacology
  4. Establish and maintain professional relationships
  5. Understand pharmacology
  6. Perform evaluation to identify drug indications and contraindications
  7. Seek drug reference literature
  8. Take a drug history from their patients including:
     - a. Prescribed medications
       - (1) Name
       - (2) Strength
       - (3) Daily dosage
     - b. Over-the-counter medications
     - c. Vitamins
     - d. Drug reactions
  9. Consult with medical direction

XII. Autonomic pharmacology
- A. Nervous system organization and function
  1. Characteristics of nervous system components
     - a. Central nervous system
     - b. Peripheral nervous system
     - c. Somatic system
     - d. Autonomic nervous system (ANS)
     - e. Sympathetic branch of ANS
     - f. Parasympathetic branch of ANS
- B. Peripheral nervous system characteristics
- C. Autonomic nervous system characteristics
  1. Parasympathetic and sympathetic characteristics
  2. Autonomic antagonists
  3. Physiological antagonism between sympathetic and parasympathetic discharge - organ responses
- D. Direction of sympathetic influences
- E. Neurochemical transmission
  1. Events involved in neurochemical transmission
  2. Activities within the synapse
  3. Synthesis of acetylcholine
- F. Other receptors
  1. Catecholamines and related substances
     - a. Dopamine
     - b. Norepinephrine
     - c. Epinephrine

- d. Serotonin
- 2. Agonist-gated ion channel receptors and G-protein-linked receptors
- 3. Neuroactive peptides
  - a. Endorphins

G. Effector cell response
- 1. Second messenger cellular amplification systems
- 2. Receptor down-regulation
- 3. Receptor up-regulation

H. Termination of neurotransmission

I. Altering neurotransmission with drugs
- 1. Modification of chemical transmission by drugs

J. Receptor location and selective drug action
- 1. Autonomic neurotransmitters
- 2. Acetylcholine (cholinergic) receptor locations
- 3. Norepinephrine (adrenergic) receptor locations

K. Selective drug action - nicotinic and muscarinic receptors
- 1. Nicotinic receptor locations
- 2. Muscarinic receptor locations

L. Biological model systems and receptor characterization

M. Receptor structure

N. Synaptic control mechanisms

XIII. General properties of drugs

A. Drugs do not confer any new functions on a tissue or organ in the body, they only modify existing functions

B. Drugs in general exert multiple actions rather than a single effect

C. Drug action results from a physiochemical interaction between the drug and a functionally important molecule in the body

D. Drugs that interact with a receptor to stimulate a response are known as agonists

E. Drugs that attach to a receptor but do not stimulate a response are called antagonists

F. Drugs that interact with a receptor to stimulate a response, but inhibit other responses are called partial agonists

G. Once administered, drugs go through four stages
- 1. Absorption
- 2. Distribution
- 3. Metabolism
- 4. Excretion

XIV. Drug forms

A. Liquid drugs
- 1. Solutions
- 2. Tinctures
- 3. Suspensions
- 4. Spirits
- 5. Emulsions
- 6. Elixirs
- 7. Syrups

B. Solid drug forms
- 1. Pills
- 2. Powders

- 3. Tablets
- 4. Suppositories
- 5. Capsules

C. Gas forms

XV. Overview of the routes of drug administration

A. The mode of drug administration effects the rate at which onset of action occurs and may effect the therapeutic response that results

B. The choice of the route of administration is crucial in determining the suitability of a drug

C. Drugs are given for either their local or systemic effects

D. The routes of drug administration are categorized as

XVI. Routes of medication administration

A. Inhalation route (nebulized medications)

B. Enteral (drugs administered along any portion of the gastrointestinal tract)

- a. Sublingual
- b. Buccal
- c. Oral
- d. Rectal
- e. Nasogastric

C. Parenteral (any medication route other than the alimentary canal)

- a. Subcutaneous
- b. Intramuscular
- c. Intravenous
- d. Intrathecal
- e. Pulmonary
- f. Intralingual
- g. Intradermal
- h. Transdermal
- i. Umbilical
- j. Intraosseous
- k. Nasal

D. Endotracheal

XVII. Mechanisms of drug action

A. To produce optimal desired or therapeutic effects, a drug must reach appropriate concentrations at its site of action

B. Molecules of the chemical compound must proceed from point of entry into the body to the tissues with which they react

C. The magnitude of the response depends on the dosage and the time course of the drug in the body

D. Concentration of the drug at its site of action is influenced by various processes, which are divided into three phases of drug activity

1. Pharmaceutical
   - a. Disintegration of dosage form
   - b. Dissolution of drug
2. Pharmacokinetic
   - a. Absorption
   - b. Distribution
   - c. Metabolism

- d. Excretion
- 3. Pharmacodynamic
  - a. Drug-receptor interaction

XVIII. Pharmacokinetics

- A. Passive transport
- B. Active transport
- C0 Absorption
  - 1 Variables that affect drug absorption
    - a0 Nature of the absorbing surface
    - b0 Blood flow to the site of administration
    - c0 Solubility of the drug
    - d0 pH
    - e0 Drug concentration
    - f0 Dosage form
    - g0 Routes of drug administration
    - h0 Bioavailability
  - 2 Mechanisms involved in absorption
    - a0 Diffusion
    - b0 Osmosis
    - c0 Filtration
- D0 Distribution
  - 1 Drug reservoirs
    - a0 Plasma protein binding
    - b0 Tissue binding
  - 2 Barriers to drug distribution
    - a0 Blood-brain barrier
    - b0 Placental barrier
- E0 Biotransformation
  - 1 Active metabolites
  - 2 Inactive metabolites
- F0 Excretion
  - 1 Organs of excretion
    - a0 Kidneys
    - b0 Intestine
    - c0 Lungs
    - d0 Sweat and salivary glands
    - e0 Mammary glands

XIX Pharmacodynamics

- A0 Theories of drug action - most drugs produce their effects by one of the following ways
  - 1 Drug-receptor interaction
    - a0 Agonists
    - b0 Antagonists
    - c0 Affinity
    - d0 Efficacy
    - e0 Types of receptors
      - (1) $Beta_1$
      - (2) $Beta_2$
      - (3) $Alpha_1$

- (4) Alpha$_2$
- (5) Dopaminergic
- (6) Others

2 Drug-enzyme interaction
3 Nonspecific drug interaction

B0 Drug-response relationship
- 1 Plasma level profile of a drug
- 2 Biologic half-life
- 3 Therapeutic threshold or minimum effective concentration
- 4 Therapeutic index

C0 Factors altering drug responses
- 1 Age
- 2 Body mass
- 3 Sex
- 4 Environmental milieu
- 5 Time of administration
- 6 Pathologic state
- 7 Genetic factors
- 8 Psychologic factors

D0 Predictable responses
- 1 Desired action
- 2 Side effects

E0 Iatrogenic responses (adverse effects produced unintentionally)

F0 Unpredictable adverse responses
- 1 Drug allergy (medications frequently implicated in allergic reactions)
- 2 Anaphylactic reaction
- 3 Delayed reaction ("serum sickness")
- 4 Hypersensitivity
- 5 Idiosyncracy
- 6 Tolerance
- 7 Cross tolerance
- 8 Tachyphylaxis
- 9 Cumulative effect
- 10 Drug dependence
- 11 Drug interaction
- 12 Drug antagonism
- 13 Summation (addition or additive effect)
- 14 Synergism
- 15 Potentiation
- 16 Interference

XX Drug interactions

A0 Variables influencing drug interaction include
- 1 Intestinal absorption
- 2 Competition for plasma protein binding
- 3 Drug metabolism or biotransformation
- 4 Action at the receptor site
- 5 Renal excretion
- 6 Alteration of electrolyte balance

B0 Drug-drug interactions

- **C0 Other drug interactions**
  - **1 Drug-induced malabsorption of foods and nutrients**
  - **2 Food-induced malabsorption of drugs**
  - **3 Alteration of enzymes**
  - **4 Alcohol consumption**
  - **5 Cigarette smoking**
  - **6 Food-initiated alteration of drug excretion**
- **D0 Drug incompatibilities - occur when drugs are mixed before administration**

XXI Drug storage
- **A0 Certain precepts should guide the manner in which drugs are secured, stored, distributed, and accounted for**
- **B0 Refer to local protocol**
- **C0 Drug potency can be affected by**
  - **1 Temperature**
  - **2 Light**
  - **3 Moisture**
  - **4 Shelf life**
- **D0 Applies also to diluents**
- **E0 Security of controlled medications**
  - **1 Procedures and other measures to ensure the security of controlled medications**

XXII Components of a drug profile
- **A0 Drug names**
- **B0 Classification**
- **C0 Mechanisms of action**
- **D0 Indications**
- **E0 Pharmacokinetics**
- **F0 Side/ adverse effects**
- **G0 Routes of administration**
- **H0 How supplied**
- **I0 Dosages**
- **J0 Contraindications**
- **K0 Considerations for pediatric patients, geriatric patients, pregnant patients, and other special patient groups**
- **L0 Other profile components**

XXIII Drugs by classifications
- **A0 Analgesics and antagonists**
  - **1 Nonprescription analgesic-antipyretics**
  - **2 Opioid analgesics-agonists**
  - **3 Adjuvant medications**
  - **4 Opioid antagonists**
  - **5 Opioid agonist-antagonist agents**
- **B0 Anesthetics**
  - **1 Anesthesia**
  - **2 Significant drug interactions**
  - **3 Special anesthesia considerations**
  - **4 Types of anesthetics**
    - **a0 Inhalation anesthetics**

- b0 Intravenous anesthetics
- c0 Ultra-short-acting barbiturates
- d0 Dissociative anesthetic
- e0 Neuroleptanesthesia

5 Local anesthesia
- a0 Surface or topical anesthesia

6 Anesthesia by injection

C0 Antianxiety, sedative, and hypnotic drugs

1 Physiology of sleep

2 Benzodiazepines

3 Benzodiazepine antidote

4 Barbiturates

5 Miscellaneous sedatives and hypnotics
- a0 Antianxiety agents/ sedatives
- b0 Hypnotics

D0 Anticonvulsants

1 Anticonvulsant therapy

2 Hydantoins

3 Barbiturates

4 Succinimides

5 Diones

6 Benzodiazepines

7 Other Anticonvulsants

E0 Central nervous system stimulants

1 Anorexiant drugs

2 Amphetamines

3 Other central nervous system stimulants

F0 Psychotherapeutic drugs

1 The central nervous system and emotions

2 The role of drug therapy in psychiatry

3 Antipsychotic or neuroleptic agents
- a0 Phenothiazine derivatives
- b0 Butyrophenone derivatives
- c0 Dihydroindolone derivatives
- d0 Dibenzoxapine derivatives

4 Antidepressant therapy
- a0 Monoamines
- b0 Tricyclic antidepressants
- c0 Monoamine oxidase inhibitor antidepressants
- d0 Antimanic drugs

G0 Drugs for specific CNS-peripheral dysfunctions

1 Parkinson's disease

2 Drugs with central anticholinergic activity
- a0 Anticholinergic agents
- b0 Drugs affecting brain dopamine
  - (1) Drugs that increase brain levels of dopamine
  - (2) Dopamine-releasing drug
  - (3) Dopaminergic agonists
- c0 Monoamine oxidase inhibitor

H0 Drugs affecting the parasympathetic nervous system

- 1 Cholinergic drugs
  - a0 Direct-acting cholinergic drugs (choline esters)
  - b0 Indirect-acting cholinergic drugs
  - c0 Drugs used to treat myasthenia gravis
- 2 Cholinergic blocking drugs
  - a0 Muscarinic blocking drugs
  - b0 Belladonna alkaloids
  - c0 Synthetic substitutes for atropine
- 3 Ganglionic stimulating drugs
  - a0 Nicotine
- 4 Ganglionic blocking drugs

I0 Drugs affecting the sympathetic (adrenergic) nervous system

- 1 Adrenergic drugs
  - a0 Direct-acting adrenergic drugs
    - (1) Catecholamines
  - b0 Drugs used for hypoperfusion
  - c0 Indirect- and dual-acting adrenergic drugs
- 2 Adrenergic blocking drugs
  - a0 Alpha-adrenergic blocking drugs
  - b0 Noncompetitive, long-acting antagonists
  - c0 Competitive, short-acting antagonists
  - d0 Beta-adrenergic blocking agents

J0 Skeletal muscle relaxants

- 1 Central-acting skeletal muscle relaxants
- 2 Direct-acting skeletal muscle relaxants

K0 Drugs affecting the cardiovascular system

- 1 Antidysrhythmics
  - a0 Group I-A Drugs
  - b0 Group I-B Drugs
  - c0 Group I-C Drugs
  - d0 Group I Drugs (A, B, C)
  - e0 Group II Drugs
  - f0 Group III Drugs
  - g0 Group IV Drugs (miscellaneous drug group)
- 2 Antihypertensives
  - a0 Diuretic drugs
    - (1) Thiazides
    - (2) Loop diuretics
    - (3) Potassium-sparing agents
  - b0 Adrenergic inhibiting (sympatholytic) agents
    - (1) Beta-adrenergic blocking agents
    - (2) Centrally-acting adrenergic inhibitors
    - (3) Peripheral adrenergic inhibitors
    - (4) Rauwolfia derivatives
    - (5) Alpha-adrenergic blocking drugs
  - c0 Angiotensin-converting enzyme inhibitors
  - d0 Calcium channel blocking agents
  - e0 Vasodilators
    - (1) Arteriolar dilator drugs
    - (2) Arterial and venous dilator drugs

- f0 Ganglionic blocking drugs
- g0 Monoamine oxidase inhibiting drugs

3 Cardiac glycosides
- a0 Digitalis glycosides
- b0 Miscellaneous agents

4 Calcium channel blockers

5 Vasodilators
- a0 Antianginal drugs
- b0 Nitrates
- c0 Drugs for peripheral occlusive arterial disease
- d0 Other vasodilating agents

6 Antihemorrheologic agents

L0 Anticoagulants, thrombolytics, and blood components

1 Anticoagulant drugs
- a0 Parenteral anticoagulant drugs
- b0 Parenteral anticoagulant antagonists
- c0 Oral anticoagulant therapy
- d0 Oral anticoagulant antagonist - vitamin K

2 Thrombolytic therapy

3 Antihemophilic agents

4 Hemostatic agents

5 Blood and blood components
- a0 Replacement therapies

M0 Antihyperlipidemic drugs

N0 Diuretics

1 Proximal tubule diuretics

2 Diluting segment diuretics (thiazide and thiazide-type drugs)

3 Loop diuretics

4 Distal tube diuretics/ potassium-sparing diuretics

5 Osmotic diuretics

6 Diuretic combinations

O0 Drug therapy for renal system dysfunction

P0 Mucokinetic and bronchodilator drugs

1 Mucokinetic drugs
- a0 Diluents
- b0 Aerosol therapy
- c0 Mucolytic drugs
- d0 Drugs that antagonize bronchial secretions

2 Bronchodilator drugs
- a0 Sympathomimetic drugs
  - (1) Nonselective adrenergic drugs
  - (2) Nonselective beta-adrenergic drugs
  - (3) Selective $beta_2$ receptor drugs
  - (4) Catecholamine $beta_2$ receptor agents
  - (5) Noncatecholamine $beta_2$ receptor drugs

3 Xanthine derivatives

4 Prophylactic asthmatic drugs
- a0 Inhalation corticosteroid therapy

Q0 Oxygen and miscellaneous respiratory agents

1 Drugs that affect the respiratory center

		a0	Oxygen therapy
		b0	Direct respiratory stimulants
		c0	Reflex respiratory stimulants
		d0	Respiratory depressants
	2		Cough suppressants
		a0	Opioid antitussive drugs
		b0	Nonopioid antitussive drugs
	3		Nasal decongestants
	4		Antihistamines
	5		Serotonin
	6		Antiserotonin
R0			Drugs affecting the gastrointestinal system
	1		Drugs that affect the stomach
		a0	Antacid combinations
		b0	Antiflatulents
		c0	Digestants
		d0	Antiemetics
		e0	Cannabinoids
		f0	Emetic agents
		g0	Cytoprotective agents
		h0	H_2 receptor antagonists
	2		Drugs affecting the lower gastrointestinal tract
		a0	Laxatives
		b0	Antidiarrheals
S0			Ophthalmic drugs
	1		Antiglaucoma agents
	2		Mydriatic and cycloplegic agents
	3		Antiinfective/ antiinflammatory agents
	4		Topical anesthetic agents
	5		Other ophthalmic preparations
T0			Drugs affecting the ear
	1		Antibiotic ear preparations
	2		Steroid and antibiotic combinations
	3		Miscellaneous preparations
U0			Drugs affecting the pituitary
	1		Anterior pituitary hormones
	2		Posterior pituitary hormones
V0			Drugs affecting the parathyroid and thyroid
	1		Thyroid preparations
	2		Antithyroid agents
	3		Iodine products
	4		Thiomide derivatives
W0			Drugs affecting the adrenal cortex
	1		Glucocorticoids
	2		Mineralocorticoids
	3		Antiadrenals (adrenal steroid inhibitors)
X0			Drugs affecting the pancreas
	1		Insulin preparations
	2		Oral hypoglycemic agents
	3		Hyperglycemic agents

Y0	**Drugs affecting the female reproductive system**	
	1	**Female sex hormones**
		a0 Estrogens
		b0 Progesterone and progestins
	2	**Oral contraceptives**
	3	**Ovulatory stimulants and drugs used for infertility**
Z0	**Drugs for labor and delivery**	
	1	**Drugs affecting the uterus**
		a0 Oxytocics
		b0 Premature labor inhibitors
AA0	**Drugs affecting the male reproductive system**	
	1	**Testosterone**
BB0	**Drugs affecting sexual behavior**	
	1	**Drugs used to impair libido and sexual gratification**
	2	**Drugs used to enhance libido and sexual gratification**
CC0	**Antineoplastic agents**	
DD0	**Drugs used in infectious disease and inflammation**	
EE0	**Antibiotics**	
	1	**Penicillins**
	2	**Cephalosporins and related products**
	3	**Macrolide antibiotics**
	4	**Tetracyclines**
	5	**Miscellaneous antibiotics**
FF0	**Antifungal and antiviral drugs**	
	1	**Antifungal drugs**
	2	**Antiviral drugs**
GG0	**Other antimicrobial drugs and antiparasitic drugs**	
	1	**Antimalarial medications**
	2	**Antituberculous agents**
	3	**Antiamebiasis agents**
	4	**Anthelmintic agents**
	5	**Leprostatic agents**
HH0	**Nonsteroidal antiinflammatory drugs**	
II0	**Uricosuric drugs**	
JJ0	**Serums, vaccines, and other immunizing agents**	
KK0	**Drugs affecting the immunologic system**	
	1	**Immunosuppressants**
	2	**Immunomodulating agents**
LL0	**Dermatologic drugs**	
	1	**General dermatologic preparations**
	2	**Prophylactic agents**
MM0	**Vitamins and minerals**	
	1	**Vitamins**
		a0 Fat-soluble vitamins
		b0 Water-soluble vitamins
	2	**Minerals**
NN0	**Fluids and electrolytes**	
	1	**Parenteral solutions**
	2	**Electrolytes**
OO0	**Antidotes/ overdoses**	

1 Specific to the type of poison
a0 Elimination

UNIT TERMINAL OBJECTIVE

1-8 At the completion of this unit, the paramedic student will be able to safely and precisely access the venous circulation and administer medications.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-8.1 Review the specific anatomy and physiology pertinent to medication administration. (C-1)
1-8.2 Review mathematical principles. (C-1)
1-8.3 Review mathematical equivalents. (C-1)
1-8.4 Differentiate temperature readings between the Centigrade and Fahrenheit scales. (C-3)
1-8.5 Discuss formulas as a basis for performing drug calculations. (C-1)
1-8.6 Discuss applying basic principles of mathematics to the calculation of problems associated with medication dosages. (C-1)
1-8.7 Describe how to perform mathematical conversions from the household system to the metric system. (C-1)
1-8.8 Describe the indications, equipment needed, technique used, precautions, and general principles of peripheral venous or external jugular cannulation. (C-1)
1-8.9 Describe the indications, equipment needed, technique used, precautions, and general principles of intraosseous needle placement and infusion. (C-1)
1-8.10 Discuss legal aspects affecting medication administration. (C-1)
1-8.11 Discuss the "six rights" of drug administration and correlate these with the principles of medication administration. (C-1)
1-8.12 Discuss medical asepsis and the differences between clean and sterile techniques. (C-1)
1-8.13 Describe use of antiseptics and disinfectants. (C-1)
1-8.14 Describe the use of universal precautions and body substance isolation (BSI) procedures when administering a medication. (C-1)
1-8.15 Differentiate among the different dosage forms of oral medications. (C-3)
1-8.16 Describe the equipment needed and general principles of administering oral medications. (C-3)
1-8.17 Describe the indications, equipment needed, techniques used, precautions, and general principles of administering medications by the inhalation route. (C-3)
1-8.18 Describe the indications, equipment needed, techniques used, precautions, and general principles of administering medications by the gastric tube. (C-3)
1-8.19 Describe the indications, equipment needed, techniques used, precautions, and general principles of rectal medication administration. (C-3)
1-8.20 Differentiate among the different parenteral routes of medication administration. (C-3)
1-8.21 Describe the equipment needed, techniques used, complications, and general principles for the preparation and administration of parenteral medications. (C-1)
1-8.22 Differentiate among the different percutaneous routes of medication administration. (C-3)
1-8.23 Describe the purpose, equipment needed, techniques used, complications, and general principles for obtaining a blood sample. (C-1)
1-8.24 Describe disposal of contaminated items and sharps. (C-1)
1-8.25 Synthesize a pharmacologic management plan including medication administration. (C-3)
1-8.26 Integrate pathophysiological principles of medication administration with patient management. (C-3)

AFFECTIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-8.27 Comply with paramedic standards of medication administration. (A-1)
1-8.28 Comply with universal precautions and body substance isolation (BSI). (A-1)

1-8.29 Defend a pharmacologic management plan for medication administration. (A-3)
1-8.30 Serve as a model for medical asepsis. (A-3)
1-8.31 Serve as a model for advocacy while performing medication administration. (A-3)
1-8.32 Serve as a model for disposing contaminated items and sharps. (A-3)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-8.33 Use universal precautions and body substance isolation (BSI) procedures during medication administration. (P-2)
1-8.34 Demonstrate cannulation of peripheral or external jugular veins. (P-2)
1-8.35 Demonstrate intraosseous needle placement and infusion. (P-2)
1-8.36 Demonstrate clean technique during medication administration. (P-3)
1-8.37 Demonstrate administration of oral medications. (P-2)
1-8.38 Demonstrate administration of medications by the inhalation route.(P-2)
1-8.39 Demonstrate administration of medications by the gastric tube. (P-2)
1-8.40 Demonstrate rectal administration of medications. (P-2)
1-8.41 Demonstrate preparation and administration of parenteral medications. (P-2)
1-8.42 Demonstrate preparation and techniques for obtaining a blood sample. (P-2)
1-8.43 Perfect disposal of contaminated items and sharps. (P-3)

DECLARATIVE

I. Review of mathematical principles
- **A. Multiplication and division**
- **B. Roman numerals**
- **C. Fractions**
- **D. Decimal fractions**
- **E. Proportions**
- **F. Percent**

II. Mathematical equivalents used in pharmacology
- **A. The metric system**
- **B. Conversions between the household and metric system**
- **C. Fahrenheit scale for temperature reading**
- **D. Celsius (centigrade) scale for temperature reading**
- **E. Converting between Fahrenheit and Celsius temperatures**

III. Calculating drug dosages
- **A. Calculation methods**
  - **1. Fraction method**
  - **2. Ratio method**
  - **3. Desired dose over available concentration method**
- **B. Calculating dosages**
  - **1. Oral medications**
    - **a. Capsules and tablets**
    - **b. Liquids**
  - **2. Parenteral medications**
    - **a. Quantity (typically weight)**
    - **b. Volume**
    - **c. Units (e.g., insulin)**
  - **3. Intravenous infusions**
    - **a. Flow rates**
    - **b. Flow rates for infants and children**
    - **c. Total infusion time**
    - **d. Other factors influencing flow rates**
  - **4. Calculating dosages for infants and children**
    - **a. Body weight**
    - **b. Body surface area (BSA)**
    - **c. Use of tables, charts, and other adjuncts**
    - **d. Length-based resuscitation tapes**

IV. Medical direction
- **A. Medication administration is bound by the paramedic's on-line or off-line medical direction**
- **B. Role of the medical director**
- **C. Patient management protocols**
  - **1. Written standing orders**
- **D. Legal considerations - policies and procedures which specify regulations of medication administration**

- **V. Principles of medication administration**
  - **A. Local drug distribution system - policies which establish stocking and supply of drugs**
  - **B. Paramedic's responsibility associated with the drug order**
    - **1. Verification of the drug order**
  - **C. The "six rights" of medication administration**
    - **1. "Right" patient**
    - **2. "Right" drug**
    - **3. "Right" dose**
    - **4. "Right" route**
    - **5. "Right" time**
    - **6. "Right" documentation**

- **VI. Medical asepsis**
  - **A. Clean technique versus sterile technique**
  - **B. Sterilization**
  - **C. Antiseptics**
  - **D. Disinfectants**

- **VII. Universal precautions and body substance isolation (BSI) in medication administration**

- **VIII. Venous access**
  - **A. Intravenous cannulation**
    - **1. General principles**
    - **2. Types**
      - **a. Peripheral**
        - **(1) General principles**
        - **(2) Indications**
        - **(3) Precautions**
        - **(4) Equipment**
        - **(5) Technique**
          - **(a) Extremity**
            - **i) Indications**
            - **ii) Precautions**
            - **iii) Equipment**
            - **iv) Procedure**
          - **(b) External jugular**
            - **i) Indications**
            - **ii) Precautions**
            - **iii) Equipment**
            - **iv) Procedure**
      - **b. Central**
  - **B. Intraosseous needle placement and infusion**
    - **1. General Principles**
    - **2. Indications**
    - **3. Precautions**
    - **4. Equipment**
    - **5. Technique**

- **IX. Medication administration by the inhalation route**
  - **A. Bronchdilators (beta agonist) medications**
    - **1. Other medications**
  - **B. Equipment**
    - **1. Oxygen or compressed air source**
    - **2. Small volume nebulizer (SVN)**
      - **a. Other inhaler equipment**
      - **b. Other adapter equipment**
      - **c. Modified inhaler equipment**
  - **C. Administering medications by the inhalation route**
    - **1. Indications**
    - **2. Techniques**
    - **3. Precautions**
    - **4. General principles of administering medications by the inhalation route**

- **X. Enteral medication administration**
  - **A. Oral administration of medications**
    - **1. Dosage forms of solid-form and liquid-form oral medications**
      - **a. Capsules**
      - **b. Time-released capsules**
      - **c. Lozenges**
      - **d. Pills**
      - **e. Tablets**
      - **f. Elixirs**
      - **g. Emulsions**
      - **h. Suspensions**
      - **i. Syrups**
    - **2. Equipment**
      - **a. Souffle cup**
      - **b. Medicine cup**
      - **c. Medicine dropper**
      - **d. Teaspoons**
      - **e. Oral syringes**
      - **f. Nipples**
    - **3. General principles for administration of solid-form and liquid-form oral medications**
  - **B. Administration of medications by the gastric tube**
    - **1. Indications for administering medications by the gastric tube**
      - **a. Nasogastric tube**
      - **b. Orogastric tube**
    - **2. Required equipment**
    - **3. Techniques used**
    - **4. Precautions**
    - **5. General principles for administration of medications by the gastric tube**
  - **C. Rectal administration of medications**
    - **1. Indications for rectal administration of medications**
    - **2. Required equipment**
    - **3. Techniques used**
    - **4. Precautions**
    - **5. General principles for rectal administration of medications**

- **XI. Parenteral administration of medications**
  - **A. Parenteral routes**
    - **1. Intradermal**
    - **2. Subcutaneous**
    - **3. Intramuscular**
    - **4. Intravenous**
    - **5. Intraosseous**
    - **6. Percutaneous**
  - **B. Reasons for parenteral administration of medications**
  - **C. Equipment used in parenteral administration of medications**
    - **1. Syringes**
      - **a. Calibration of the syringe**
      - **b. Prefilled syringes**
    - **2. Needles**
      - **a. Parts of the needle**
    - **3. Selection of the syringe and needle**
    - **4. Packaging of syringes and needles**
    - **5. Packaging of parenteral medications**
      - **a. Ampules**
      - **b. Vials**
      - **c. Prefilled syringes**
      - **d. Other**
    - **6. Intravenous (IV) administration sets**
      - **a. Various types**
      - **b. Macrodrip chamber-type**
      - **c. Microdrip chamber-type**
      - **d. Variety of extensions and other pieces of equipment**
      - **e. Some IV administration sets are manufacturer specific**
    - **7. Intravenous (IV) solutions**
      - **a. Types of containers**
      - **b. Variety of volumes**
    - **8. "Piggyback" administration**
      - **a. Primary IV infusion**
      - **b. Secondary IV infusion**
      - **c. Related equipment to connect secondary infusion to primary infusion**
    - **9. Volume control intravenous set**
      - **a. Various brands**
  - **D. Preparation of parenteral medication**
    - **1. Equipment needed for preparing a parenteral medication**
    - **2. Standard procedures for preparing all parenteral medications**
    - **3. Guidelines for preparing medications**
      - **a. To prepare a medication from an ampule**
      - **b. Reconstitution of a sterile powder**
      - **c. Removal of a volume of liquid from a vial**
      - **d. Preparing a drug from a mix-o-vial**
      - **e. Preparing two medications in one syringe**
  - **E. Administration of medication by the intradermal route**
    - **1. Intradermal route: injections are made into the dermal layer of skin just below the epidermis**
    - **2. Equipment needed for administration of a medication by the intradermal route**

3. Locate anatomical sites
4. Technique for administration of medication by the intradermal route
5. Documentation

F. Administration of medication by the subcutaneous route
   1. Subcutaneous route: injections are made into the loose connective tissue between the dermis and muscle layer
   2. Equipment needed for administration of a medication by the subcutaneous route
   3. Locate anatomical sites
      a. Upper arms
      b. Anterior thighs
      c. Abdomen
      d. Sublingual
   4. Technique for administration of medication by the subcutaneous route
   5. Precautions

G. Administration of medication by the intramuscular route
   1. Intramuscular route - injections are made by penetrating a needle through the dermis and subcutaneous tissue into the muscle layer
   2. Equipment needed for administration of a medication by the intramuscular route
   3. Locate anatomical sites for adults and children
      a. Vastus lateralis muscle
      b. Rectus femoris muscle
      c. Gluteal area
      d. Deltoid muscle
   4. Technique for administration of medication by the intramuscular route
   5. Precautions

H. Administration of medication by the intravenous route
   1. Intravenous route
      a. Places the drug directly into the bloodstream
      b. Bypasses all barriers to drug absorption
   2. Drugs may be administered by direct injection with a needle and syringe, but more commonly drugs are given intermittently or by continuous infusion through an established peripheral or central line
   3. Purpose for a peripheral IV site
   4. Purpose for a central IV site
   5. Dosage forms for IV administration
   6. Equipment needed for administration of a medication by the peripheral or central IV route
   7. Anatomical sites for adults, children, and infants
      a. Peripheral access
      b. Central access
   8. General principles of IV medication administration
   9. Preparing an IV solution for infusion
      a. Equipment
      b. Technique
      c. Warming or cooling an IV solution, as indicated
   10. Adding medication to an existing IV solution
   11. Steps in performing venipuncture
   12. Steps in performing administration of medications into an established IV line
   13. Steps in performing administration of medication by a heparin lock
   14. Steps in adding a medication to an IV bag, bottle, or volume control

15. Steps in adding a medication with a piggyback or secondary set
16. Steps in changing to the next container of IV solution
17. Steps in administering medication by a venous access device (Indwelling Vascular Device)
    a. Equipment
    b. Technique
18. Steps to discontinue an intravenous infusion
    a. Equipment
    b. Technique
19. Steps in monitoring IV therapy
    a. Various types of infusion pumps
20. Complications
    a. Phlebitis or infection
    b. Extravasation
    c. Air in tubing
    d. Circulatory overload and pulmonary edema
    e. Allergic reaction
    f. Pulmonary embolism
    g. Failure to infuse properly

I. Administration of percutaneous medications
1. Percutaneous route - application of a medication for absorption through the mucous membranes or skin
2. Factors which influence the amount of medication absorbed through the skin or mucous membranes
3. Methods of percutaneous administration of medications
4. Steps in preparing percutaneous medications
5. Topical medications - applied directly to the area of skin requiring treatment
    a. Common forms of topical medications
    b. Steps in administering topical medications
6. Administering medications to mucous membranes
    a. Places where medications are commonly applied
        (1) Under the tongue (sublingual)
        (2) Against the cheek (buccal)
        (3) In the eye
        (4) In the nose
        (5) In the ear
        (6) Inhaled into the lungs
            (a) Through an aerosol or nebulizer
            (b) Through positive pressure ventilation
    b. Dosage forms
        (1) Tablets
        (2) Drops
        (3) Ointments
        (4) Creams
        (5) Suppositories
        (6) Metered-dose inhalers
    c. Equipment needed for administration of each type of medication
    d. Steps for the administration of the dosage form of medication to the place it is commonly applied

J. Administration of medication by the intraosseous route

1. Any solution or drug that can be administered intermittently or by continuous infusion can be administered by the intraosseous route
2. Purpose for the intraosseous route
   a. Shock
   b. Status epilepticus
   c. Other conditions
3. Equipment needed
4. Anatomical sites
5. General principles of administering solution or medication administration via the intraosseous route
6. Steps in establishing an intraosseous route for an IV solution or medication administration
7. Steps in performing administration of medications by the intraosseous route
   a. Need for injection of medication with saline flush
   b0 Need for administration of fluids

8 Steps to discontinue an intraosseous infusion
   a0 Equipment
   b0 Technique

9 Complications
   a0 Phlebitis or infection
   b0 Extravasation
   c0 Compartment syndrom
   d0 Fracture
   e0 Air embolism due to air in tubing
   f0 Pulmonary embolism due to marrow particles (bone and fat)
   g0 Circulatory overload and pulmonary edema
   h0 Allergic reaction
   i0 Failure to flush the intraosseous needle
   j0 Failure to infuse properly

XII Obtaining a blood sample
- A0 Purposes for obtaining a blood sample
- B0 Equipment needed for obtaining a blood sample
- C0 Locations from which to obtain a blood sample
  - 1 Anatomical sites
  - 2 From the established intravenous catheter
  - 3 Other locations
- D0 Steps to preparing equipment for obtaining a blood sample
- E0 Techniques for obtaining a blood sample
- F0 Complications

XIII Disposal of contaminated items and sharps
- A0 Follow local protocol for disposal of contaminated items and sharps

UNIT TERMINAL OBJECTIVE

1-9 At the completion of this unit, the paramedic student will be able to integrate the principles of therapeutic communication to effectively communicate with any patient while providing care.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-9.1 Define communication. (C-1)
1-9.2 Identify internal and external factors that affect a patient/ bystander interview conducted by a paramedic. (C-1)
1-9.3 Restate the strategies for developing patient rapport. (C-1)
1-9.4 Provide examples of open-ended and closed or direct questions. (C-1)
1-9.5 Discuss common errors made by paramedics when interviewing patients. (C-1)
1-9.6 Identify the nonverbal skills that are used in patient interviewing. (C-1)
1-9.7 Restate the strategies to obtain information from the patient. (C-1)
1-9.8 Summarize the methods to assess mental status based on interview techniques. (C-1)
1-9.9 Discuss the strategies for interviewing a patient who is unmotivated to talk. (C-1)
1-9.10 Differentiate the strategies a paramedic uses when interviewing a patient who is hostile compared to one who is cooperative. (C-3)
1-9.11 Summarize developmental considerations of various age groups that influence patient interviewing. (C-1)
1-9.12 Restate unique interviewing techniques necessary to employ with patients who have special needs. (C-1)
1-9.13 Discuss interviewing considerations used by paramedics in cross-cultural communications. (C-1)

AFFECTIVE OBJECTIVES

1-9.14 Serve as a model for an effective communication process. (A-3)
1-9.15 Advocate the importance of external factors of communication. (A-2)
1-9.16 Promote proper responses to patient communication. (A-2)
1-9.17 Exhibit professional non-verbal behaviors. (A-2)
1-9.18 Advocate development of proper patient rapport. (A-2)
1-9.19 Value strategies to obtain patient information. (A-2)
1-9.20 Exhibit professional behaviors in communicating with patients in special situations. (A-3)
1-9.21 Exhibit professional behaviors in communication with patient form different cultures. (A-3)

PSYCHOMOTOR OBJECTIVES

None identified for this unit.

DECLARATIVE

- **I. Communication**
  - **A. Communication process**
    - **1. Source**
      - **a. Common symbols**
      - **b. Clear format**
      - **c. Medium**
        - **(1) Written**
        - **(2) Verbal**
        - **(3) Other symbols**
    - **2. Encoding**
      - **a. The act of placing a message in an understandable format**
      - **b. Procedure of translating a message into a code that is understood by sender and receiver**
    - **3. Message**
      - **a. Code and format intended to deliver idea**
    - **4. Decoding**
      - **a. Act of interpreting symbols and format**
      - **b. The decoding process can have many flaws**
        - **(1) Symbols or words sent in the message are not common to both parties**
        - **(2) Interpretation of message is based on different understandings of symbols or format**
    - **5. Receiver**
      - **a. Person intended to understand message**
      - **b. In order for a message to be successful, the source must try to encode in a way the receiver understands**
    - **6. Feedback**
      - **a. The response to a message**
- **II. Internal factors for effective communication**
  - **A. Liking others**
    - **1. Helping profession**
    - **2. Genuine liking of people is necessary**
    - **3. Understanding of human strengths and weaknesses**
  - **B. Empathy is viewing the world from another inner frame of reference while remaining yourself**
  - **C. Ability to listen**
    - **1. Not passive role, but active**
    - **2. Requires complete attention**
    - **3. Requires practice**
- **III. External factors for effective communication**
  - **A. Privacy**
    - **1. Strive for privacy when interviewing**
    - **2. Helps to eliminate inhibitions and distractions**
  - **B. Interruptions**
    - **1. Attempt to avoid except when patient care information is being received from partners and is of a critical nature**

- **C. Physical environment**
  - **1. Lighting**
  - **2. Noise/ interference**
  - **3. Distracting equipment**
  - **4. Distance**
    - **a. Comfortable distance is 4 to 5 feet**
    - **b. Twice the patient's arms length away**
    - **c. "Personal space"**
  - **5. Equal seating - eye level**
- **D. Dress**
  - **1. Appearance and clothing should be clean and meet conventional professional standards**
  - **2. Easily identified as a paramedic**
- **E. Note taking**
  - **1. Look at the patient frequently**
  - **2. Eyes should be on the patient as much as possible during an interview**

IV. Introducing the interview - the paramedic should remain calm and begin the interview with open-ended questions

- **A. Open-ended questions**
  - **1. Asked in a narrative form**
  - **2. Encourages the patient to talk**
  - **3. Doesn't restrict area of response**
- **B. Closed or direct questions**
  - **1. Ask for specific information**
  - **2. One or two words and may be answered as "yes" or "no"**
  - **3. Fill-in information left out in the narrative interview**
  - **4. May provide specific facts**
- **C. One question at a time**
  - **1. The patient may not know which question to answer**
  - **2. May leave out portions of the information or become confused**
  - **3. Allow complete answers**
- **D. Choose language the patient understands**

V. Responses

- **A. Facilitation - encourages patient to provide more information**
- **B. Silence - gives the patient more time to gather their thoughts**
- **C. Reflection - echoing the patient's words back to them using slightly different words**
- **D. Empathy - patient feels accepted and more open to talking**
- **E. Clarification - used when the patient uses a word which is confusing to the paramedic**
- **F. Confrontation - focusing patient's attention on one specific factor of interview**
- **G. Interpretation**
  - **1. Based upon observation or conclusion**
  - **2. It links events, makes associations or implies a cause**
- **H. Explanation - informing the patient and sharing factual or objective information**
- **I. Summary**
  - **1. Review of interview and interpretation of situation**
  - **2. Open-ended to allow patient to clarify details**

VI. Traps of interviewing

- A. Providing false assurance or reassurance
- B. Giving advice
- C. Authority
- D. Using avoidance language
- E. Distancing
- F. Professional jargon
- G. Leading or biased questions
- H. Talking too much
- I. Interrupting
- J. Using "why" questions

VII. Non-verbal skills
- A. Physical appearance
  - 1. Interviewer
    - a. Professional appearance, physically fit, and well groomed are important characteristics
    - b. Help gain patient's trust
  - 2. Patient
    - a. Note the patient's appearance, clothing, jewelry, and other physical signs
    - b. Will give you some indication of their condition
- B. Posture and gestures
  - 1. Interviewer
    - a. Relaxed
    - b. Calm, slow motion
  - 2. Patient
    - a. Open position - arms extended and large muscles relaxed
    - b. Closed position - flexed arms and legs
  - 3. Gestures
    - a. Acceptance
      - (1) Nodding
      - (2) Open hands
    - b. Defensive or angry
      - (1) Shaking head
      - (2) Pointing
      - (3) Closed hands
  - 4. Facial expressions
    - a. Reflects a wide variety of relevant emotions and conditions
    - b. Indicate relaxation, relief, pain, fear, anger, sorrow, etc.
  - 5. Eye contact - lack of eye contact suggests the patient is shy, withdrawn, confused, bored, intimidated, apathetic or depressed
  - 6. Voice - intensity, rate of speech, pitch and tone of voice have meaning in communication
  - 7. Touch - the meaning of touch is influenced by the person's age, sex, cultural background, past experience and current setting

VIII. Developing patient rapport
- A. Put the patient and yourself at ease - let the patient know you are on their side, that you respect their comments, and you are there to help them
  - 1. Ask the patient their name and assure you can pronounce it correctly
  - 2. Recognize signs

3. Respond to signs
4. Find the suffering and show compassion
5. Assess insight and become an ally
6. Show expertise

IX. Strategies to get information

- **A. Patients generally communicate in three ways**
  1. Pouring out the information (complaints)
  2. By revealing some problems but concealing embarrassing items
  3. Hiding the most embarrassing parts to both the paramedic and himself
- **B. Obtaining information on complaints is accomplished based upon techniques of open-ended and closed or direct questions**
  1. Resistance
     - a. Two main reasons for resistance
       - (1) The patient wishes to maintain an image
       - (2) The patient is uncertain about the paramedic's response and fear of rejection or ridicule
     - b. The paramedic must be non-judgmental if they expect to obtain information from the patient
     - c. Paramedics must be willing to talk with patients about any condition the patient may have
  2. Shifting focus
     - a. Approach a problem the patient does not want to talk about by shifting the focus away from the problem
     - b. Return focus to it from a different angle
  3. Defense mechanisms
     - a. Be aware of the patient's defense mechanisms
     - b. Anticipate them in advance
     - c. Confront them if necessary to obtain necessary medical information
  4. Distraction
     - a. When the patient is acting-out and hostile
     - b. Point out their behavior to them
     - c. Ask them if their behavior is their intention, and let them know this behavior is self-defeating

X. Methods to assess mental status during the interview

- **A. Observation**
  1. Appearance
  2. Consciousness
  3. Psychomotor movements
  4. Abnormal complex movements
- **B. Conversation**
  1. Orientation
     - a. Person
     - b. Place
     - c. Time
  2. Speech
     - a. Note the speed of speech
     - b. Note the flow of speech
  3. Thinking

- 4. Attention
- 5. Concentration
- 6. Comprehension
- 7. Remote, recent and immediate memory
  - a. Memory of event
  - b. Long and short term memory
- 8. Affect
  - a. Patient's emotional response to external and internal events
- 9. Autonomic responses - sweating, trembling, etc.
- 10. Facial movements - muscles around mouth, nose and eyes
- 11. Reactive movements - made in response to novel movements such as looks at you when you are talking
- 12. Grooming movements
  - a. Fixing hair
  - b. Straightening clothes
  - c. Indicate patient is uncomfortable

C. Exploration - offers a method to review the patient's internal experiences

- 1. Mood
- 2. Energy level
- 3. Content of thinking

XI. Special interview situations

A. Patients unmotivated to talk

- 1. Most patients are more than willing to talk
  - a. Some will require more time and varying techniques to communicate with during an interview
- 2. Difficult interviews stem from four sources
  - a. Patient's signs and symptoms may impact the ability to talk
  - b. The patient may fear talking with you due to psychological disorders, cultural differences or age
  - c. A cognitive impairment may be developing in the patient
  - d. The patient may intentionally want to deceive you
- 3. Techniques to use - many are already known but they must be used in a special way with the patient who does not talk
  - a. Start the interview in the normal manner. When the patient does not talk, review the reason why you were called according to dispatch and take time to develop rapport with the patient.
  - b. Attempt to use open-ended questions
  - c. If unsuccessful, try direct questions
  - d. Provide some positive feedback to any responses by the patient
  - e. Make sure the patient understands the questions
    - (1) Language barriers
    - (2) Hearing difficulty
  - f. Continue to ask questions about the critical information you need to know to progress with treatment
  - g. You may not be able to obtain information about non-essential information
  - h. Ask family members or others at the scene if the patient has been non-communicative for a long time, attempt to rule out a pathology
  - i. Use summary and interpretation of events or conditions and ask the patient if your summary or interpretation is correct

- j. See if you can get the patient to ask questions about your care, equipment, profession or any topic which will create conversation. If the patient does ask you questions make sure you answer them fully, not one word answers.
- k. Don't be discouraged. You may not obtain all the information you are seeking. Observe affect and record information to establish a mental status baseline for later evaluations.
- l. You may desire to ask questions that you already know the answer to establish the patient's credibility

B. Interviewing a hostile patient
- 1. Closely monitor with overpowering force
- 2. Be sure to stay far enough away from the patient, close to an exit
- 3. Personal safety
- 4. Never leave the patient alone without adequate assistance
- 5. Use the same interviewing techniques
- 6. Set limits and establish boundaries
- 7. Tell the patient of the advantages of cooperation
- 8. Be aware of local protocol for hostile patients, use of restraints, and psychological medications

C. Developmental considerations when interviewing patients
- 1. Children - you must build rapport with two persons, the child and the parent
  - a. Begin conversations with both the child and parent
  - b. With younger children, 1 to 6 years old, focus most of your conversation with the parent
  - c. Offer the child toys or something to keep them occupied while you interview the parent
    - (1) Be aware you are collecting the child's history from a parent's point of view
    - (2) Your interview can put the parent on the defensive
    - (3) Be cautious not to be judgmental if the parents have not provided proper care or safety for the child before your arrival
    - (4) Be observant but not confrontational
  - d. Make contact with the child in a gradual approach as you are interviewing the parent
  - e. Speak to children at eye level
  - f. Use a quiet, calm voice
  - g. Be aware of your non-verbal communication
  - h. Be knowledgeable of communication with children according to their age group
    - (1) Infants
      - (a) Respond best to firm, gentle handling and a quiet calm voice
      - (b) Older infants may have stranger anxiety so keep the parent within their view
    - (2) Preschoolers
      - (a) See the world only from their perspective
      - (b) Use short sentences with concrete explanations
    - (3) School aged children
      - (a) More objective and realistic
    - (4) Adolescents
      - (a) Want to be adults
      - (b) Should not be communicated with as children

- **D. The older adult- they are seeking the meaning of older age, dealing with disease and the inevitability of their death**
  - **1. Address older adults always by their last name with Mr., Mrs., or Ms.**
  - **2. Interviews usually take longer**
  - **3. Fatigue**
  - **4. Older patients may have physical disabilities that cause the interview to take longer**
  - **5. Touch is a non-verbal skill that is important to older persons**
- **E. Hearing impaired patients**
  - **1. Ask a deaf person their preferred method to communicate, either lip reading, signing, or writing**
  - **2. Using writing is the best out-of-hospital method to communicate with the patient**
  - **3. If they are lip reading be sure to face the patient squarely and have good lighting on your face**
  - **4. Be aware that many hearing impaired patients will nod "yes" even if they do not understand what was asked**
- **F. Patients under the influence of street drugs or alcohol**
  - **1. Ask simple or direct questions**
  - **2. Do not be threatening, avoid confrontation**
- **G. Sexually aggressive patients**
  - **1. Confront the patient so they are sure to understand your professional position and that you are a care giver**
  - **2. Document any unusual occurrences with patients and have a witness to any of your actions or the incident and document their observations**
  - **3. May want to consider "same sex" witness or tape recording all interaction in the back of the ambulance**
- **H0 Transcultural considerations in communicating with patients**
  - **1 Introduce yourself and the way in which you want to be called**
    - **a0 By first name, last name, or title**
    - **b0 Ask the patient to do the same**
  - **2 Both the paramedic and the patient will bring cultural stereotypes to a professional relationship. The role of a family member in providing care must be understood and explained.**
  - **3 Ethnocentrism - viewing your own life as the most desirable, acceptable or best and to act in a superior manner to another culture's way of life**
  - **4 Cultural imposition - tendency to impose your beliefs, values, and patterns of behavior on individuals from another culture**
  - **5 Space between the paramedic and the patient is important and varies among different cultures**
    - **a0 Intimate zone**
      - **(1) 0 to 1.5 feet**
      - **(2) Visual distortion occurs**
      - **(3) Best for assessing breath and other body odors**
    - **b0 Personal distance**
      - **(1) 1.5 to 4 feet**
      - **(2) Perceived as extension of self, voice is moderate, body odors are not apparent, no visual distortion**
      - **(3) Much of the physical assessment occurs at this distance**
    - **c0 Social distance**
      - **(1) 4 to 12 feet**

		(2)	Used for impersonal business transactions, perceptual information much less detailed
		(3)	Much of a patient interview will occur at this distance
	d0	Public distance	
		(1)	12+ feet
		(2)	Interaction with others is impersonal, speakers voice must be projected, subtle facial expressions imperceptible
6	Some cultures are more comfortable at a variety of spaces when communicating		
7	Some cultures expect health care workers to have all the answers to their illness		
8	Some cultures during illness or injury accept the sick role in different ways		
9	Nonverbal communication such as handshaking and touching may be perceived differently in different cultures		
10	Asian, Native Americans, Indochinese, and Arabs may consider direct eye contact impolite or aggressive and they may avert their eyes during an interview		
11	Touch, especially between members of different culture groups may be of concern		
12	Language - paramedics may encounter patients who do not speak the same language		

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UNIT TERMINAL OBJECTIVE

1-10 At the completion of this unit, the paramedic student will be able to integrate the physiological, psychological, and sociological changes throughout human development with assessment and communication strategies for patients of all ages.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

1-10.1 Compare the physiological and psychosocial characteristics of an infant with those of an early adult. (C-3)
1-10.2 Compare the physiological and psychosocial characteristics of a toddler with those of an early adult. (C-3)
1-10.3 Compare the physiological and psychosocial characteristics of a pre-school child with those of an early adult. (C-3)
1-10.4 Compare the physiological and psychosocial characteristics of a school-aged child with those of an early adult. (C-3)
1-10.5 Compare the physiological and psychosocial characteristics of an adolescent with those of an early adult. (C-3)
1-10.6 Summarize the physiological and psychosocial characteristics of an early adult. (C-3)
1-10.7 Compare the physiological and psychosocial characteristics of a middle aged adult with those of an early adult. (C-3)
1-10.8 Compare the physiological and psychosocial characteristics of a person in late adulthood with those of an early adult. (C-3)

AFFECTIVE OBJECTIVES

1-10.9 Value the uniqueness of infants, toddlers, pre-school, school aged, adolescent, early adulthood, middle aged, and late adulthood physiological and psychosocial characteristics. (A-3)

PSYCHOMOTOR OBJECTIVES

None identified for this unit.

DECLARATIVE

I. Infancy (birth to 1 year)
- **A. Physiological**
  - **1. Vital signs**
    - **a) Heart rate**
      - **(1) 100 to 160 beats per minute during first 30 minutes**
      - **(2) Settling around 120 beats per minute**
    - **b) Respiratory**
      - **(1) Rate**
        - **(a) Initially 40 - 60**
        - **(b) Dropping to 30 - 40 after first few minutes of life**
        - **(c) Slowing to 20 - 30 by one year**
      - **(2) Tidal volume**
        - **(a) 6 - 8 ml/ kg initially**
        - **(b) Increasing to 10 - 15 ml/ kg by 1 year**
    - **c) Blood pressure**
      - **(1) Average systolic blood pressure increases from 70 at birth to 90 at 1 year**
    - **d) Temperature ranges**
      - **(1) 98 to 100 degrees Fahrenheit is the thermoneutral range**
  - **2. Weight**
    - **a) Normally 3.0-3.5 kg. at birth**
    - **b) Normally drops 5-10% in the first week of life due to excretion of extracellular fluid**
    - **c) Exceed birth weight by second week**
    - **d) Grows at approximately 30 gm/day during the first month**
    - **e) Should double weight by 4-6 months**
    - **f) Should triple weight at 9-12 months**
    - **g) Infants head equal to 25% of the total body weight**
  - **3. Cardiovascular system**
    - **a) Circulatory changes soon after birth**
      - **(1) Closing of the ductus arteriosus**
      - **(2) Closing of the ductus venosus**
      - **(3) Closing of the foramen ovale**
      - **(4) Immediate increase in systemic vascular resistance**
      - **(5) Decrease in pulmonary vascular resistance**
    - **b) Left ventricle strengthens throughout first year**
  - **4. Pulmonary system**
    - **a) Airways, shorter, narrower, less stable, more easily obstructed**
    - **b) Infants primarily nose breathers until 4 weeks**
    - **c) Lung tissue is fragile and prone to barotrauma**
    - **d) Fewer alveoli with decreased collateral ventilation**
    - **e) Accessory muscles immature, susceptible to early fatigue**
    - **f) Chest wall less rigid**
    - **g) Ribs positioned horizontally, causing diaphragmatic breathing**
    - **h) Higher metabolic and oxygen consumption rates than adults**
    - **i) Rapid respiratory rates lead to rapid heat, and fluid loss**
  - **5. Renal system**

- a) Kidneys unable to concentrate urine
- b) Specific gravity rarely exceeds 1.020

6. Immune system
   - a) Passive immunity retained through the first 6 months of life
   - b) Based on maternal antibodies

7. Nervous system
   - a) Movements
     - (1) Strong, coordinated suck and gag
     - (2) Well flexed extremities
     - (3) Extremities move equally when infant is stimulated
   - b) Reflexes
     - (1) Moro reflex
     - (2) Palmar grasp
     - (3) Sucking reflex
     - (4) Rooting reflex
   - c) Fontanelles
     - (1) Posterior fontanelle closes at 3 months
     - (2) Anterior fontanelle closes between 9 to 18 months
     - (3) Fontanelles may provide an indirect estimate of hydration
   - d) Sleep
     - (1) Initially sleeps 16-18 hours per day with sleep and wakefulness evenly distributed over 24 hours.
     - (2) Gradually decreases to 14-16 hours per day with 9-10 hour concentration at night
     - (3) Sleeps through the night at 2-4 months
     - (4) Normal infant is easily arousable

8. Musculoskeletal system
   - a) Bone growth
     - (1) Epiphyseal plate - length
     - (2) Growth in thickness occurs by deposition of new bone on existing bone
     - (3) Is influenced by
       - (a) Growth hormone
       - (b) Genetic factors
       - (c) Thyroid hormone
       - (d) General health
   - b) Muscle weight is about 25% in infants

9. Dental system
   - a) Teeth begin to erupt at 5-7 months

10. Growth and development in infants
    - a) Rapid changes over first year
      - (1) 2 months
        - (a) Tracks objects with eyes
        - (b) Recognizes familiar faces
      - (2) 3 months
        - (a) Moves objects to mouth with hands
        - (b) Displays primary emotions with distinct facial expressions
      - (3) 4 months
        - (a) Drools without swallowing
        - (b) Reaches out to people

- (4) 5 months
  - (a) Sleeps throughout night without food
  - (b) Discriminates between family and strangers
- (5) 6 months
  - (a) Sits upright in a highchair
  - (b) Makes one syllable sounds; e.g., ma, mu, da, di
- (6) 7 months
  - (a) Fear of strangers
  - (b) Quickly changes from crying to laughing
- (7) 8 months
  - (a) Responds to “no”
  - (b) Sits alone
  - (c) Plays “peek-a-boo”
- (8) 9 months
  - (a) Respond to adult anger
  - (b) Pulls self to standing position
  - (c) Explores objects by mouthing, sucking, chewing, and biting
- (9) 10 months
  - (a) Pays attention to own name
  - (b) Crawls well
- (10) 11 months
  - (a) Attempts to walk without assistance
  - (b) Shows frustration to restrictions
- (11) 12 months
  - (a) Walks with help
  - (b) Knows own name

B. Psychosocial development
- 1. Family processes - reciprocal socialization
  - a) Scaffolding
  - b) Attachment
  - c) Trust versus mistrust
  - d) Secure attachment
- 2. Temperament - infants may be
  - a) Easy child
  - b) Difficult child
  - c) Slow to warm-up child
- 3. Crying
  - a) Basic cry
  - b) Anger cry
  - c) Pain cry
- 4. Trust - based on consistent parental care
- 5. Situational crisis - parental separation reactions
  - a) Protest
  - b) Despair
  - c) Withdrawal
- 6. Growth charts
  - a) Good for comparing physical development to norm

II. Toddler (12 to 36 months) and pre-school age (3 to 5 years)

A. Physiological

- **1. Vital signs**
  - **a) Heart rate**
    - **(1) Toddlers - 80 to 130 beats per minute**
    - **(2) Preschoolers - 80 to 120 beats per minute**
  - **b) Respiratory rate**
    - **(1) Toddlers - 20 to 30**
    - **(2) Preschoolers- 20 to 30**
  - **c) Systolic blood pressure**
    - **(1) Toddlers - 70 to 100 mmHg**
    - **(2) Preschools - 80 to 110 mmHg**
  - **d0 Temperature - 96.8 to 99.6 F degrees Fahrenheit**
- **2 Weight**
  - **a0 Rate of gain slows dramatically**
  - **b0 Average child gains 2 kg per year**
- **3 Cardiovascular system**
  - **a0 Capillary beds better developed to assist in thermoregulation**
  - **b0 Hemoglobin levels approach normal adult levels**
- **4 Pulmonary system**
  - **a0 Terminal airways continue to branch**
  - **b0 Alveoli increase in number**
- **5 Renal system**
  - **a0 Kidneys are well developed in toddler years**
  - **b0 Specific gravity and other urine findings similar to adults**
- **6 Immune system**
  - **a0 Passive immunity lost, more susceptible to minor respiratory and gastrointestinal infections**
  - **b0 Develops immunity to common pathogens as exposure occurs**
- **7 Nervous system**
  - **a0 Brain 90% of adult weight**
  - **b0 Myelination increases cognitive development**
  - **c0 Development allows effortless walking and other basic motor skills**
  - **d0 Fine motor skills developing**
- **8 Musculoskeletal system**
  - **a0 Muscle mass increases**
  - **b0 Bone density increases**
- **9 Dental system**
  - **a0 All primary teeth have erupted by 36 months**
- **10 Elimination patterns**
  - **a0 Toilet training**
    - **(1) Physiologically capable by 12 to 15 months**
    - **(2) Psychologically ready between 18 and 30 months**
    - **(3) Average age for completion - 28 months**
- **11 Sensory**
  - **a0 Visual acuity - 20/ 30 during the toddler years**
  - **b0 Hearing - essential maturity at 3 to 4 years**

- **B0 Psychosocial**
- **1 Cognitive**
  - **a0 Basics of language mastered by approximately 36 months, with continued refinement throughout childhood**
  - **b0 Understands cause and effect between 18-24 months**

- c0 Develops separation anxiety - approximately 18 months
- d0 Develops magical thinking - between 24 and 36 months

2 Play
- a0 Exploratory behavior accelerates
- b0 Able to play simple games and follow basic rules
- c0 Begin to display competitiveness
- d0 Observation of play may uncover frustrations otherwise unexpressed

3 Sibling relationships
- a0 Sibling rivalry
- b0 First born children
  - (1) Usually maintain special relationship with parents
  - (2) Expected to exercise self-control and show responsibility in interacting with younger siblings

4 Peer group functions
- a0 Children about the same age and maturity levels
- b0 Provide a source of information about the outside world and other families
- c0 Become more important to the child throughout childhood

5 Parenting styles and its effect on children
- a0 Authoritarian parenting
- b0 Authoritative parenting
- c0 Permissive-indifferent parenting
- d0 Permissive-indulgent parenting

6 Divorce effects on child development
- a0 Mediated by
  - (1) Age
  - (2) Cognitive and social competencies
  - (3) Amount of dependency on parents
  - (4) Type of day care
  - (5) Parents' ability to respond to the child's needs

7 Television
- a0 May be a cause in aggression at this age
- b0 Careful screening of television exposure may be effective

8 Modeling
- a0 Children begin to recognize the differences of sex
- b0 Begin to model themselves based on sex

III School age children (6 to 12 years)

A0 Physiological

1 Vital signs
- a0 Heart rate - 70 to 110 beats per minute
- b0 Respiratory rate - 20 to 30
- c0 Systolic blood pressure - 80 to 120 mmHg
- d0 Temperature - 98.6 degrees Fahrenheit

2 Growth rate
- a0 Average child gains 3 kg per year and 6 cm per year

3 Bodily functions
- a0 Most reach adult levels during this period
- b0 Lymph tissues proportionately larger than adult
- c0 Brain function increases in both hemispheres
- d0 Loss of primary teeth and replacement with permanent teeth begins

- **B0 Psychosocial**
  - **1 Families**
    - **a0 Children allowed more self regulation**
    - **b0 Parents still provide general supervision**
    - **c0 Parents spend less time with children in this age group**
  - **2 Develop self-concept**
    - **a0 More interaction with adults and children**
      - **(1) Begin comparing themselves with others**
      - **(2) Develop self-esteem**
        - **(a) Tends to be higher during early years of school than later years**
        - **(b) Often based on external characteristics**
        - **(c) Effected by peer popularity, rejection, emotional support, and neglect**
        - **(d) Negative self-esteem can be damaging to further development**
  - **3 Moral development**
    - **a0 Pre-conventional reasoning**
      - **(1) Punishment and obedience**
      - **(2) Individualism and purpose**
    - **b0 Conventional reasoning**
      - **(1) Interpersonal norms**
      - **(2) Social system morality**
    - **c0 Post-conventional reasoning**
      - **(1) Community rights versus individual rights**
      - **(2) Universal ethical principles**
    - **d0 Individuals move through development throughout school age and young adulthood at different paces**

- **IV Adolescence - (13 to 18 years)**
  - **A0 Physiological**
    - **1 Vital signs**
      - **a0 Heart rate - 55 to 105 beats per minute**
      - **b0 Respiratory rate - 12 to 20 breaths per minute**
      - **c0 Blood pressure - 100 to 120**
      - **d0 Temperature- 98.6 degrees Fahrenheit**
    - **2 Growth rate**
      - **a0 Most experience a rapid 2-3 year growth spurt**
        - **(1) Begins distally with enlargement of feet and hands**
        - **(2) Enlargement of the arms and legs follows**
        - **(3) Chest and trunk enlarge in final stage**
      - **b0 Girls are mostly done growing by age 16, boys are mostly done growing by age 18**
      - **c0 Secondary sexual development occurs**
        - **(1) Noticeable development of the external sexual organs**
        - **(2) Pubic and axillary hair develops**
        - **(3) Vocal quality changes occur (mostly in males)**
        - **(4) Menstruation initiates (in females)**
      - **d0 Endocrine changes**
        - **(1) Female**

- (a) FSH and LH release
- (b) Gonadotropin promote estrogen and progesterone production
- (c) Other biologic changes

(2) Male

- (a) Gonadotropin promote testosterone production

e0 Reproductive maturity
f0 Muscle mass and bone growth nearly complete
g0 Body fat decreases early in adolescence, and begins to increase later

(1) Females require 18-20% body fat percentage for menarche to occur

h0 Blood chemistry nearly equal to adult levels
i0 Skin toughens through sebaceous gland activity

B0 Psychosocial

1 Family

a0 Conflicts arise

(1) Adolescents strive for autonomy
(2) Biological changes associated with puberty
(3) Increased idealism
(4) Independence and identity changes

2 Develop identity

a0 Self-consciousness increases
b0 Peer pressure increases
c0 Interest in the opposite sex increases
d0 Want to be treated like adults
e0 Progress through various stages based on how they handle crisis, etc.
f0 Anti-social behavior peaks around eighth or ninth grade
g0 Minority adolescents tend to have more identity crisis than non-minority
h0 Body image of great concern

(1) Continual comparison amongst peers
(2) Eating disorders are common

i0 Self-destructive behaviors begin

(1) Tobacco
(2) Alcohol
(3) Illicit drugs

j0 Depression and suicide more common than any other age group

3 Ethical development

a0 Develop capability for logical, analytical, and abstract thinking
b0 Develop a personal code of ethics

V Early adulthood (20 to 40 years)

A0 Physiological

1 Vital signs

a0 Heart rate - average 70 beats per minute
b0 Respiratory rate - average 16 to 20
c0 Blood pressure - average 120/ 80 mmHg
d0 Temperature - 98.6 degrees Fahrenheit

2 Peak physical conditioning between 19 and 26 years of age
3 Adults develop lifelong habits and routines during this time
4 All body systems at optimal performance
5 Accidents are a leading cause of death in this age group

- **B0 Psychosocial**
  - **1 Experience highest levels of job stress during this time**
  - **2 Love develops**
    - **a0 Romantic love**
    - **b0 Affectionate love**
  - **3 Childbirth most common in this age group**
    - **a0 New families provide new challenges and stress**
  - **4 This period is less associated with psychological problems related to well-being**

VI Middle adulthood (41 to 60 years)

- **A0 Physiological**
  - **1 Vital signs**
    - **a0 Heart rate - average 70 beats per minute**
    - **b0 Respiratory rate - average 16 - 20**
    - **c0 Blood pressure - average 120/ 80 mmHg**
    - **d0 Temperature - 98.6 degrees Fahrenheit**
  - **2 Body still functioning at high level with varying degrees of degradation**
  - **3 Vision changes**
  - **4 Hearing less effective**
  - **5 Cardiovascular health becomes a concern**
    - **a0 Cardiac output decreases throughout this period**
    - **b0 Cholesterol levels increased**
  - **6 Cancer strikes in this age group often**
  - **7 Weight control more difficult**
  - **8 Menopause in women in late 40s early 50s**
- **B0 Psychosocial**
  - **1 Adults in this group more concerned with "social clock"**
    - **a0 Task oriented**
    - **b0 Pressed for time to accomplish lifelong goals**
  - **2 Approach problems more as challenges than threats**
  - **3 Empty-nest syndrome**
  - **4 Often burdened by financial commitments for elderly parents as well as young adult children**

VII Late adulthood (61 years and older)

- **A0 Physiological**
  - **1 Vital signs**
    - **a0 Heart rate - depends on patient's physical and health status**
    - **b0 Respiratory rate - depends on patient's physical and health status**
    - **c0 Blood pressure - depends on patient's physical and health status**
    - **d0 Temperature - 98.6 degrees Fahrenheit**
  - **2 Life span - maximum approximately 120 years.**
  - **3 Life expectancy - average length based on year of birth**
  - **4 Cardiovascular function changes**
    - **a0 Blood vessels**
      - **(1) Thickening**
      - **(2) Increased peripheral vascular resistance**
      - **(3) Reduced blood flow to organs**
      - **(4) Decreased baroreceptor sensitivity**

- (5) By 80 years of age, there is approximately 50% decrease in vessel elasticity
- b0 Heart
  - (1) Increased workload causes
    - (a) Cardiomegaly
    - (b) Mitral and aortic valve changes
    - (c) Decreased myocardial elasticity
  - (2) Myocardium is less able to respond to exercise
  - (3) Fibrous tissues in SA node
  - (4) Pacemaker cells diminish resulting in arrhythmia
  - (5) Tachycardia not well tolerated
- c0 Blood cells
  - (1) Functional blood volume decreased
  - (2) Decrease in platelet count
  - (3) RBCs diminished
  - (4) Poor iron levels

5 Respiratory system
- a0 Changes in mouth, nose, and lungs
- b0 Metabolic changes lead to decreased lung function
- c0 Muscular changes
  - (a) Diaphragm elasticity diminished
  - (b) Chest wall weakens
- d0 Diffusion through alveoli diminished
  - (a) Life long exposure to pollutants, etc.
- e0 Lung capacity diminished
- f0 Coughing ineffective
  - (1) Weakened chest wall
  - (2) Weakened bone structure

6 Endocrine system changes
- a0 Decreased glucose metabolism
- b0 Decreased insulin production
- c0 Thyroid shows some diminished T3 production
- d0 Cortisol diminished by 25 %
- e0 Pituitary gland 20% less effective
- f0 Reproductive organs atrophy in women

7 Gastrointestinal system
- a0 Mouth, teeth, and saliva changes
- b0 Peristalsis decreased
- c0 Esophageal sphincter less effective
- d0 GI secretions decreased
- e0 Vitamin and mineral deficiencies
- f0 Internal intestinal sphincters lose tone

8 Renal system
- a0 50% nephrons lost
- b0 Abnormal glomeruli more common
- c0 Decreased elimination

9 Sensory changes
- a0 Loss of taste buds
- b0 Olfactory diminished
- c0 Diminished pain perception

		d0	Diminished kinesthetic sense
		e0	Visual acuity diminished
		f0	Reaction time diminished
		g0	Presbycusis problems with hearing
	10	Nervous system	
		a0	Neuron loss
		b0	Neurotransmitters diminish
		c0	Sleep - wake cycle disrupted
B0	Psychosocial		
	1	Terminal drop hypothesis	
		a0	Death preceded by a decrease in cognitive functioning over a five year period prior to death
	2	Wisdom attributed to age in some cultures	
	3	95% of older adults live in communities	
	4	Challenges	
		a0	Self worth
		b0	Declining well being
		c0	Financial burdens
		d0	Death or dying of companions